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WHO CHRONICLE

VOL. 13, No. 12 - DECEMBER 1959

Health and welfare of seafarers in Europe

Control of narcotic drugs

International Pyrogen Reference Preparation

Methods of radiochemical analysis

Names for pharmaceutical preparations

WORLD HEALTH ORGANIZATION
PALAIS DES NATIONS
GENEVA

The World Health Organization (WHO) is one of the specialized agencies of the United Nations. Through this organization, which came into being in 1948, the public health and medical professions of more than 80 countries exchange their knowledge and experience, and collaborate in an effort to achieve the highest possible level of health throughout the world. WHO is not concerned with problems which individual countries or territories can solve with their own resources. It deals, rather, with problems which can only be satisfactorily solved through the co-operation of all, or certain groups of, countries—the eradication of diseases such as malaria, the control of cholera, plague, yellow fever, smallpox and rickettsiosis. Progress towards better health throughout the world also demands international co-operation in many other activities : for example, setting up standards for biological substances, for insecticides and insecticide spraying equipment ; compiling an international pharmacopoeia ; drawing up international sanitary regulations ; revising the international lists of diseases and causes of death ; assembling and disseminating epidemiological information ; recommending non-proprietary names for drugs ; and promoting the exchange of scientific knowledge. In many parts of the world, there is need for improvement in maternal and child health, nutrition, nursing, mental health, environmental sanitation, public health administration, professional education and training, and health education of the public. Thus a very large share of the Organization's resources is devoted to giving assistance and advice in these fields to countries and territories whose health services are in an early state of development and which are therefore weak points in the common front against disease.

- ***WHO Chronicle***

  (formerly *Chronicle of the World Health Organization*), published by WHO for the medical and public health professions, provides a monthly record of the principal health activities undertaken in various countries with WHO assistance. It also contains summaries and detailed accounts of the other publications issued by the Organization.
  The Chronicle is published in English, French, Spanish, Russian and Chinese.

- ***Bulletin of the World Health Organization***

  contains technical articles, in English or French, contributed by physicians and scientists engaged in public health work. It appears monthly and each issue runs to about 120 pages.

- ***World Health***

  an illustrated magazine for the general public, aims at giving an idea of WHO activities throughout the world and at showing some of the more striking aspects of public health work.
  This publication appears every two months in English, French, Spanish and Portuguese.

Other WHO publications: the *Technical Report Series*, the *Monograph Series*, the *Epidemiological and Vital Statistics Report*, the *International Digest of Health Legislation*, etc., are described in a catalogue which can be supplied free of charge on request.

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WORLD HEALTH ORGANIZATION

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HEALTH AND WELFARE OF SEAFARERS IN EUROPE

An article in a recent number of the WHO Chronicle [1] *discussed the modern tendency to view the health and welfare of seafarers in their broadest aspects. This tendency was a marked feature of a conference on the health and welfare of seafarers in Europe, held in Marseilles last February by the WHO Regional Office for Europe. The article below is based largely on the report of this conference, and on a paper presented to it by Dr Karl Evang, Director-General of Health Services, Norway.*

Not enough is known either of the health and welfare problems of the seafaring population or of what is being done to deal with them. Even the exact size of this population is unknown. There are rather more than 33 000 ocean-going merchant vessels, and the number of officers and crew may be roughly estimated at between 600 000 and 750 000. This number is growing with the constant increase in tonnage. There are also those who work on fishing and whaling vessels, and coasters; those on research, telecommunication, control, supervisory and similar vessels; and those in the naval forces of the various countries: and the gross total is obviously considerable. The seafaring population consists predominantly of males aged between 16 and 65, but no over-all data are available on their exact age distribution, their marital and family status, and the length of time they stay in their occupation. There is a similarity in outlook and spirit and in the general pattern of behaviour and way of life among seafarers of all nations. We do not know whether this is due to the unique character of their occupation, or to selective forces leading individuals of a certain kind to opt for the seafaring life.

Seafarers occupy a key position both in war and in peace. Victory in the two world wars went to the powers which had the largest number of ships and could control the seas. In peace, a strike or lock-out involving the merchant navy has immediate and widespread repercussions all over the world. In view of the prominent part they play seafarers should ideally as a class be responsible, alert and well informed, have high social, economic and cultural standards, and appreciate the importance of their calling. Often, however, lack of proper attention to their health and welfare has made them bitter, suspicious and withdrawn, denationalized when they lose their roots in their own country, but not internationalized in a positive sense.

It took a long time for the obvious fact to sink in that the seafarer, living, working and eating in the same place, is in an occupation which moulds his life to a greater extent than almost any other, and cannot be subjected to the same health and welfare measures as the population ashore. Much has had to be done nationally and internationally to make his living, working and eating conditions tolerably satisfactory, but there is still a long way to go before they are anything like satisfactory enough. The time now seems to be ripe for a more systematic and comprehensive approach, which must rest on the foundation of a close collaboration between the countries concerned. The days have gone when the health of seafarers was viewed solely in terms of venereal disease and alcoholism: as a group they present a very complex and interesting picture, and their health status in general is not as satisfactory as might be expected.

What particular health hazards do they face that people ashore do not normally encounter? The seafarer is exposed to a variety of climatic conditions, which may in themselves subject him to great strain; indeed, he may never become adjusted to

[1] *WHO Chronicle*, 1959, **13**, 111

them. He does not, like the landsman, live in a relatively unchanging environment, exposed on the whole to the same diseases. Every new member of the crew, every passenger, every port visited are potentially new sources of infection, and the intimate contact with his fellows on board ship increases the risk of his acquiring infection. The exposure risk is the greater because the seafarer, partly because of his occupation, partly by tradition, moves in circles ashore with a high morbidity rate. Among the communicable diseases to which he is exposed tuberculosis merits special attention, because of the threat it constitutes to the health of the crew in the confined area of a ship. It is indeed so serious a threat that several of the countries most advanced in organizing health services for their seafarers have found it advisable to introduce compulsory examination for tuberculosis, not only of all seafarers signing on, but also of the entire crew at regular intervals.

The more manifest deficiency diseases have mostly disappeared among seafarers, now that more attention is being paid to their diet. But in the rather dull routine of life at sea meals tend to play too dominant a part, and the shift system often makes them irregular. As a result, peptic ulcer, gastritis, constipation and obesity are common.

The loading and unloading of a variety of cargoes may have to be done very quickly, by methods ranging from the primitive to the highly mechanized. There may be language difficulties leading to misunderstandings and incoordination of movements. If there is a rapid turnover of the crew there may not develop among the seafarers working together a knowledge of their companions' methods of work, strength and ability. And emergencies may require sudden action with unfamiliar tools. Injuries are accordingly common. In general, too, strange though it may seem, seafarers do not get regular physical exercise. Periods of relative inactivity are followed by periods of heavy muscular effort, so that hernias, lesions of the muscles, tendons and intervertebral discs, and overstrain of the heart and vascular system may occur.

The most striking of the differences between the health hazards of seafarers and of people ashore are to be found in mental health. The seafarer is absent from his familiar home environment and from his kith and kin for irregular and often lengthy periods. He thus is denied stable human relationships, and on his return home he must readjust himself to his wife and children or to his sweetheart, who like him have had to accustom themselves to his absence and to new impressions gained while he was away. He may return home a stranger after a long voyage and leave it still a stranger, having failed to achieve a satisfactory adjustment. One or two painful experiences of this kind may destroy his basic feeling of security and his trust in the permanence of fundamental human relationships.

At sea too, since crews are always changing, he has little opportunity of establishing stable friendships, or among fluctuating human relationships he may become dangerously over-dependent upon one. At sea the environment is not only artificial, but is wholly masculine as well, so that he cannot satisfy his sexual requirements normally and healthily, either from the purely physical or from the mental and social point of view. In port he can satisfy the physical side, but only at the expense of the mental side, so that, as far as sex is concerned, the foundations of a split in personality are laid.

These factors may act in concert with the limited living space, the daily routine and the feeling of loneliness so common in seafarers on board ship, and contribute to a syndrome that has been termed " seafarers' depression". The symptoms of this condition naturally vary with the individual patient, but they may include a feeling of inferiority, unmotivated suspicion and jealousy, lack of initiative, and very often insomnia.

When he sets foot in port, the seafarer may thus be emotionally and mentally frustrated, and bursting with the tensions, agressions and conflicts of life at sea, which his circumstances on board compel him to repress. He seeks an outlet, and often finds it in an excessive consumption of alcohol, particularly if the port is strange, the language unknown, the people unfamiliar, and there

is nobody and no organization waiting to welcome him. This misuse of alcohol is a serious problem among seafarers. The best line of approach to its solution would appear to be to offer the seafarer ashore such cultural, educational and social outlets that he will not be tempted to indulge in alcohol to excess, but will look upon it as he would in his own country.

Existing health and welfare services

Generally speaking, existing medical and welfare services for the seafarer are not very satisfactory.

Usually there is no doctor aboard ship, nor are there likely to be any in the near future except in passenger ships, naval vessels and a few others, mainly of large size. Minor illnesses and accidents are treated by a ship's officer, who is not as a rule trained in first aid, and who will use the ship's medicine chest, which may or may not be satisfactory. More serious illnesses or accidents are treated by medical advice radioed to the ship. Mental or psychosomatic illness is unlikely to be treated properly at sea. Welfare services aboard, providing further education, physical exercise and high quality entertainment, are little known in merchant vessels.

In foreign ports, particularly the larger ones, first class medical facilities are often available, but equally often neither the seafarers nor the ship masters or consular representatives know how to go about finding them. Hence, only too frequently, the diagnosis and the treatment received by the seafarer are haphazard. There may also be language difficulties, and the shortness of the ship's stay in port may mean lack of continuity in treatment. In smaller ports medical facilities may be inadequate or lacking. The special facilities for the treatment of veneral diseases provided under the Brussels Agreement of 1924 are usually better than ordinary medical facilities, but in spite of advances in treatment these diseases still present a great problem among seafarers. Welfare services have improved in recent years, but are still far from satisfactory.

In home ports, seafarers usually enjoy the same medical and welfare facilities as their fellow-countrymen. Special services for seafarers are more and more being introduced especially since the end of the Second World War.

Over the past twenty years or so the social and economic conditions of seafarers have been greatly improved. National governments, trade unions and trade union federations, shipowners and shipping federations, and international organizations have all helped to bring this about. Although it is primarily concerned with such matters as labour-management relations, wages and hours, the International Labour Office (ILO) early perceived the close relationship between social and economic conditions and welfare and health, and has done much to improve them. WHO is naturally interested in the seafarer's health, and a special Joint ILO/WHO Committee on Hygiene of Seafarers has been set up. Its work was recently described in the Chronicle.[2] In 1958 a new consultative and advisory body, the Intergovernmental Maritime Consultative Organization (IMCO) was established, with its headquarters in London. It may be expected to play an increasing part, in conjunction with WHO and ILO, in promoting the health and welfare of seafarers.

Many governments have introduced or improved sickness and injury schemes, and set up special health services for seafarers, not only in their own countries but also abroad. Bold and imaginative programmes have been carried out by a variety of agencies on board ships and in ports. On board ship, clubs, groups and committees have been established; sport has been organized and competitions arranged; facilities for the study of languages, seamanship, the history and geography of other countries, etc. have been made available; and libraries, newspaper services and films have all been introduced.

The most pressing welfare problem in ports is to provide good and inexpensive hotel accommodation for seafarers. This should

[2] *WHO Chronicle*, 1959, **13**, 111

preferably also provide a basis for other welfare activities under the guidance of one or more welfare officers—sightseeing tours, games, social gatherings, and help with shopping.

Improvement of existing services

Lectures on the following subjects were given at the conference: the health and welfare of seafarers on board ship; medical facilities ashore; dental health problems; mental health problems of seamen in the merchant marine; social work among seafarers of the French merchant marine; rehabilitation; health centres for seafarers in the light of national experience.

In the last of these lectures the chief points of criticism levelled against existing health and welfare services for seafarers were summarized. The medical practitioners dealing with foreign seafarers in ports are of very unequal quality. Seafarers are sometimes sent to hospital in a haphazard way. Preventive measures are inadequate, in that no single authority—neither the port health services (because the seafarers are not their nationals), nor the ship's officer or consulate (because they are in a foreign country and have no legal basis for action)—feels that it is fully responsible for them. The result is that the seafarer often falls between two stools. The approach to mental illness in the seafarer is sometimes out of line with the modern approach. In some ports the ethical quality of the medical service is at fault. Finally, shipping companies complain that the cost of medical care is disproportionately high, and incommensurate with the quality of medical care provided.

What could be done to remedy this state of affairs ? General health services, open to seafarers of every nationality, could be provided in ports. The scope of existing services, for example those set up under the Brussels Agreement, could be widened to include other diseases and health problems. Alternatively, two or more countries could assist each other by establishing health services for their sailors in foreign ports: this has been done by Norway, which has declared itself willing to accept Danish or Swedish sailors for treatment at health centres it has set up in New York, London, Liverpool and Antwerp, provided that Sweden establishes similar centres elsewhere which will accept Norwegian sailors on a reciprocal basis. Yet another alternative would be an international agreement on the lines of the Brussels Agreement. This would have the great advantage that all seafaring nations could benefit from the service right from the beginning; it would have the disadadvantage that, since the procedure of drafting an international agreement and having it ratified by a sufficient number of governments is liable to be extremely lengthy, the service could not be inaugurated for an indefinite period. Perhaps the shipping and seafarers' organizations could arrange among themselves to establish the service on an international basis.

Whatever the way in which health centres for seafarers are established, there are certain requirements that they should meet. For one thing, they should be conveniently located. They should have modern equipment for diagnosis, treatment and minor surgery, or, if not, be able to make use of such equipment elsewhere with the minimum delay and fuss. The basic staff should consist of general practitioners with special experience in the conditions and the way of life of seafarers, but if the work so requires, specialists, in particular psychiatrists, should also do full-time or part-time duties at the centres. Each centre should be prepared on request to send doctors on board ships to try to solve medical problems that have arisen, without delaying the ships. It should regard itself as a medical clearing house in relation to immigration authorities, consulates, hospitals, etc. And it should be staffed in such a way as to reduce language difficulties to the minimum. The creation of health centres like these might mean that data on the health problems of seafarers, so largely lacking, would become available, and in their turn provide a stepping stone to further advances in dealing with these problems.

INTERNATIONAL CONTROL OF NARCOTIC DRUGS

Since the time of the first international conference on the control of narcotics, which met in 1909 in Shanghai, there has been universal recognition of the importance of preventing the abuse of narcotic drugs. Before the Second World War, the League of Nations undertook the necessary measures for international control of illicit traffic in opium, morphine and other drugs used by addicts. Through its Health Committee the League also dealt with the medical problems involved in such control. When the League of Nations was dissolved its functions were conferred upon two international organizations: the policy-making and administrative functions were transferred to the United Nations Organization whereas the specifically medical aspects came within the purview of the World Health Organization.

Present organization of international control

At the present time the principal bodies responsible for the international control of narcotic drugs are three special organs of the United Nations, namely, the Commission on Narcotic Drugs, the Permanent Central Opium Board, and the Drug Supervisory Body, while the World Health Organization is associated with them in a mainly advisory capacity. The four bodies work in close collaboration and their respective functions are clearly defined so as to ensure that their co-operation is as effective as possible.

The *Commission on Narcotic Drugs* is an organ of the Economic and Social Council. It consists of 12 permanent and 3 temporary members, the latter being appointed by the Council. Its function is to advise the Council on matters relating to the application of the conventions and agreements in force in this field and, within the limits of its advisory capacity, to determine the procedures to be adopted in all questions relating to the international control of drugs.

The *Permanent Central Opium Board* is composed of 8 experts appointed by the Economic and Social Council; its responsibilities include supervising the licit movement of narcotic drugs and deciding whether certain countries are accumulating excessive quantities of a drug or are liable to become centres of illicit traffic. It bases decisions in this respect on statistical information obtained from quarterly and annual reports transmitted to it by all countries which are parties to the International Conventions of 1925 and 1931 on narcotic drugs.[1]

The *Drug Supervisory Body* was established to determine as accurately as possible the needs of each country, on the basis of estimates furnished by governments or, failing these, by the Supervisory Body itself. These estimates are then used by the Permanent Central Opium Board to enforce import and manufacture limits. The Supervisory Body consists of 4 members, 2 appointed by the World Health Organization, 1 by the United Nations Commission on Narcotic Drugs, and the other by the Permanent Central Opium Board.

The *World Health Organization* advises on the medical aspects of drug addiction and addiction-producing drugs. It is empowered to decide whether a newly discovered product is liable to produce addiction and should therefore be subject to international control. The Organization takes such decisions on the advice of an Expert Committee on Addiction-Producing Drugs, whose activities include the examination of drugs suspected of having addiction-producing properties. Since its inception, i.e., during the last ten years, the Committee has examined 73 drugs and preparations, 55 of which were found to represent a danger to public health. The proceedings of the Committee, accompanied

[1] Convention of 19 February 1925, as amended by the Protocol of 11 December 1946; Convention of 13 July 1931 for Limiting the Manufacture and Regulating the Distribution of Narcotic Drugs, as amended by the Protocol of 11 December 1946

by statements on special problems raised by drug addiction, have been published in nine reports. It also advises on products, which, although not addiction-producing drugs, can readily be converted into them. The same Committee has also given definitions of " drug addiction" and "drug habituation ", taking into account pharmacological, psychological and public health aspects. These definitions have found world-wide acceptance. Recently, the range of drugs which need continual survey has been increased by the inclusion of hypnotic and tranquillizing, as well as stimulating, agents, although these are not addicting in the strict sense of the definition.

Furthermore, the World Health Organization has started to take an active interest in the treatment of drug addicts. In 1956 a Study Group on the Treatment and Care of Drug Addicts [2] studied in particular the medical features of drug addiction caused by opium, opiates, morphine-like synthetic drugs and cannabis, and outlined general principles as well as recommending rational methods of treatment and rehabilitation.

The chewing of coca leaves, which is so widespread in many parts of Latin America, and the increasing abuse of cannabis are other important problems dealt with by the World Health Organization, which has decided that both habits represent a considerable danger to public health and has suggested the form which international control of these types of addiction should take.

Introduction of new addiction-producing substances

The whole problem is complicated by the introduction of new therapeutic substances which may have addiction-producing properties and, above all, the continual discovery of new narcotics, mainly synthetic, which are submitted for international control every year. WHO follows developments in this field very closely and, at the request of the Economic and Social Council, has undertaken studies on the chemical structure of synthetic substances with morphine-like effects, the relationship between their chemical structure and their analgesic action, and the relationship between the latter and their addiction liability. Furthermore, the Organization has studied the therapeutic properties and side effects — especially the addiction-producing properties — of 30 drugs of practical importance which have been put on the market as substitutes for morphine and codeine.[3]

It is often difficult in the initial period of use of a new drug to determine the real requirements with any accuracy, since the therapeutic needs are not well known, and it is in the first few years following the introduction of such drugs that the Supervisory Body must exercise the greatest vigilance.

Very few governments are ready straightaway to reduce their estimated requirements in drugs which the new ones are intended to replace—with the result that there may be an unjustifiable over-all increase in the estimated requirements both for the old and for the new drugs.

Estimate of world requirements in narcotic drugs

The Supervisory Body estimates each year's requirements on the basis of data for the previous year sent in by the respective countries. In this way, it is possible to keep a check on international trade in narcotic drugs. The Supervisory Body first met in 1933 and a review of its first twenty-five years' work was made in 1958.

The statement of estimates for 1934 covered 182 countries and territories, for 54 of which estimates had been established by the Supervisory Body itself. In 1959 on the other hand, only 7 out of 167 countries and territories failed to supply the necessary information themselves. This is eloquent proof of the progress made.

The estimates for 1934 referred to 15 addiction-producing drugs, all derived from opium, whereas in 1959 there were 43 drugs,

[2] *Wld Hlth Org. techn. Rep. Ser.*, 1957, **131**

[3] *Bull. Wld Hlth Org.*, 1954, **10**, 1003; 1955, **13**, 937; 1956, **14**, 353; 1957, **17**, 569

of which 23 were not opium derivatives. This increase in the number of drugs has, of course, meant an increase in the work of the bodies concerned, but there have also been complications owing to the fact that the new drugs often have long, scientific names which lend themselves to various interpretations. The task would have been almost impossible without the help of WHO which has perfected a procedure for rapidly giving international non-proprietary names to new drugs with complicated scientific names.

The changes in the content of the estimates during the period in question are also extremely interesting. Diacetylmorphine (heroin) provides a striking example: in 1934 the requirements were 1558 kg and in 1959 they had dropped to 74 kg. WHO was largely instrumental in bringing about this change. The Sixth World Health Assembly recommended, on the proposal of the Expert Committee on Addiction-Producing Drugs, that action should be taken to try to convince physicians and governments that this particularly dangerous drug was not irreplaceable in medical practice and that its production and importation could be prohibited. Another interesting example is the decrease in the consumption of morphine, which in 1934 was estimated at 9370 kg whereas the provision for 1959 was 5066 kg. On the other hand, the estimates for conversion products of morphine are constantly rising, especially with respect to less dangerous substances, such as codeine and ethylmorphine. The greater consumption of these products may be due to the increase in the world's population, the rising standards of living, the development of medical practice and the extension of medico-social services.

It is also interesting to note that governments are becoming less and less inclined to present exaggerated estimates of their requirements. This shows that there is an increasing desire to guard against any risk of encouraging illicit traffic or drug addiction—both of which may result from the acquisition of excessive quantities.

It is clear from the foregoing that, although a great deal still remains to be done, there is an active and effective international organization for the control of addiction-producing drugs and that it is receiving increasing support from all the countries concerned.

THE INTERNATIONAL PYROGEN REFERENCE PREPARATION

Almost a century ago it was noted that the injection of sterile aqueous solutions sometimes caused serious febrile reactions in patients. Billroth drew attention to this fact in an article published in 1865.

In 1923, Florence Seibert discovered that these reactions were due to the presence in distilled water of filtrable and thermostable substances which she called " pyrogens ". Since then, pyrogens have been found in drinking and distilled water, on the glass of ampoules and receptacles, and in antibiotic preparations. Pyrogens are formed in many micro-organisms, including the ordinary bacteria in the atmosphere, mildew, and a number of contaminants which develop in a laboratory atmosphere polluted by gases, vapours or droplets of chemical substances in solution. Many widely differing micro-organisms produce pyrogens: the *Azotobacter* of the soil, plague bacilli, diphtheria bacilli, *B. subtilis*, and *Salmonella*. Although they are found in gram-positive organisms, they seem to occur more frequently in gram-negative bacilli and specifically in their somatic antigens. These antigens behave like toxins and provoke temperature disorders—hypothermia in rats, mice and guinea-pigs, and hyperthermia in the rabbit and in man.

Pyrogens have also been observed to induce haemorrhage in implanted sarcomas,

as well as leukopenia and hyperglycaemia. These symptoms are related to the presence of endotoxins—which may exist in saprophytic and parasitic as well as in autotrophic bacteria.

Pyrogens and pharmacopoeias

For many patients, the symptoms caused by pyrogens are no more than disagreeable, but they may be very dangerous for persons who are already seriously ill. Pyrogens must, therefore, be excluded from injectable preparations—from the water used as the vehicle, from the inside surface of the ampoules and from therapeutic substances, such as antibiotics, which may contain them. Pyrogens are thermostable, however: they resist the distillation temperature of water and it is therefore useless to adopt the method of successive distillations in the hope of destroying them; they even survive after autoclaving at 120°C and after exposure to dry heat at 160-170°C. To inactivate them, a temperature of at least 250°C is required, for 30 minutes. Filtering through a Seitz filter (with frequent change of filter surface), and treatment with activated charcoal or with peroxide of hydrogen are other methods.

Specifications relating to pyrogens are now included in certain pharmacopeias, owing to the general use of injectable preparations liable to contain them, and the consequent risk to patients. In the United States, the "Amendments to the Pharmacopoeia" in 1932 contained a test for the detection of pyrogens in pharmaceutical preparations. The *Pharmacopoea Internationalis* also includes a pyrogen test in the form of a biological assay on rabbits. In this test the substance is injected into the ear veins of selected rabbits, and their rectal temperature is taken one, two and three hours after injection. "The test is considered positive if 4 or more of the 8 rabbits show an individual temperature rise of 0.6°, or if the sum of the 8 temperature rises exceeds 3.7°." [1]

[1] World Health Organization (1955) *Pharmacopoea internationalis . . . International Pharmacopeia*, Geneva, Vol. 2, p. 284

Need for a reference preparation

There is still uncertainty about human sensitivity to pyrogens as compared with that of rabbits. Some workers have declared that man is definitely more sensitive, while others affirm the contrary—and the question is not settled. What are the variations in individual sensitivity in one and the same rabbit-colony and among different colonies? What is the dose-response curve in man? Is it the same with respect to all pyrogens whatever their origin? If not, where does the difference lie? Are some pyrogens equally active in man and in the rabbit? These are all questions to which an answer has to be found and this will only be possible if workers can use a standard reference preparation and thus obtain comparable results. The need for an international reference preparation was therefore imperative. In 1950 the WHO Expert Committee on Biological Standardization discussed this question and subsequently, under the auspices of WHO and through the National Institute for Medical Research in London, a number of laboratories studied two pyrogens—one an extract of *Proteus vulgaris* and the other a purified lipopolysaccharide prepared from *Serratia marcescens*. The findings were not conclusive and at later meetings of the Committee it was proposed that a bacterial pyrogen preparation which had been very extensively studied from the chemical and biological angles, whose method of purification was fairly precise, and which was easily reproducible should be adopted as the reference preparation. The preparation selected was a highly purified "O" somatic antigen of *Shigella dysenteriae*.[2]

The International Reference Preparation

The newly established International Pyrogen Reference Preparation is described in a recent number of the *Bulletin of the World Health Organization*.[3] The acetone-dried

[2] Davies, D. A. L., Morgan, W. T. J. & Mosimann, W. (1954) *Biochem. J.*, 56, 572

[3] Humphrey, J. H. & Bangham, D. R. (1959) *Bull. Wld Hlth Org.*, 20, 1241

cells of *Shigella dysenteriae* were extracted with diethylene glycol and the extract subjected to fractional precipitation. After removal of the phospholipid component, the resulting polysaccharide-protein complex was fractionated by high-speed centrifuging, and the fraction sedimenting at between 25 000 and 105 000 *g* was isolated. The material contained 4.5-4.6% nitrogen and 0.8-0.85% phosphorus and was free from detectable impurities as shown by the usual tests. A polysaccharide dissociated from the lipoprotein at alkaline pH values. The 50 lethal dose (LD_{50}) of this pyrogen is 80 μg in the mouse; in the rabbit intravenous injection of 1 μg induces the formation of *Shigella dysenteriae* agglutinins; only 0.003 μg is needed to raise the temperature of the rabbit.

This material is now at the disposal of research laboratories: it is freeze-dried in ampoules containing 2 mg of the dry substance which dissolves completely if left for one to two hours in water or saline solution.

It is hoped that the International Pyrogen Reference Preparation will be used extensively by research workers, and that ultimately it will be possible, on the basis of the various results obtained, to develop a satisfactory test for pyrogen activity of injectable preparations in terms of the International Reference Preparation.

International help in Morocco disaster

Ten thousand Moroccans in the Meknès region who were recently poisoned by mineral oil mixed with their cooking oil are to have international help for their treatment and rehabilitation.

On 18 November at WHO Headquarters, Geneva, Dr Benhima, the Secretary-General of the Moroccan Health Ministry, met with representatives of the WHO Regional Office for Europe, UNICEF, the United Nations Technical Assistance Bureau, the League of Red Cross Societies, and the International Labour Office, in order to discuss practical aid to the Moroccan Government in this tragic situation. The victims are paralysed to a greater or lesser extent. The situation is all the more serious since Morocco, with a population of some 10 million, has only 17 000 hospital beds in all. The child victims are therefore being given priority for the available beds.

The meeting recognized that both medical treatment and rehabilitation services were urgently needed. A special hospital should be established at Meknès, staffed by medical specialists, teachers, specialists in rehabilitation and health assistants. This hospital should work in liaison with 17 treatment centres in different parts of the affected region. Each centre should aim at treating 400 victims, and would require a staff of physiotherapists and health assistants. These centres could be housed in tents or temporary buildings, with mobile kitchens. Each would need a large quantity of equipment such as crutches, baths, solaria, halters, special skates and other rehabilitation apparatus.

The Moroccan Government requested the help of the WHO Regional Office for Europe on 23 September, when the first cases of poisoning appeared. The Regional Office immediately sent two scientific advisers, Dr Honor Smith and Dr J. M. K. Spalding (United Kingdom). Working with Moroccan doctors, these experts traced the cause of the outbreak to poisoning by mineral oil (tri-ortho-cresyl-phosphate) which was found mixed into the cooking oil used throughout the Meknès region. Later, the Regional Office sent Professor Leroy of the University of Rennes (France) to Morocco to estimate what measures would be needed for the treatment and rehabilitation of the victims. His report served as a basis for the relief discussions in Geneva.

INTERNATIONAL WORK IN HEALTH STATISTICS, 1948-1958*

6. International mortality statistics

General mortality

A general survey of the vast quantity of material stored in the annual and monthly statistical publications of WHO is certainly beyond the scope of the present review. It is also doubtful whether it would be fruitful, as the data clearly vary widely in completeness, accuracy and comparability. Nevertheless, there is a use for such data in studies with a specific purpose, e.g., on variations of and trends in mortality in selected countries or regions, or on mortality by cause.

Mortality statistics from various countries and territories are received by WHO directly or through the United Nations Statistical Office. This material is regularly tabulated and published in the *Annual Epidemiological and Vital Statistics* and the monthly *Epidemiological and Vital Statistics Report*.

The annual volumes have generally contained some 60 tables, but there were 74 tables in the 1958 volume, which gave data for 1955. The tables in these volumes are grouped as follows: general vital statistics of selected countries and certain large cities; causes of death according to age and sex for 30 to 40 countries; deaths and death rates from selected causes by age and sex; cases of, and deaths from, notifiable diseases for countries and territories, with seasonal distribution.

Though limited in scope, these annual volumes are growing in importance as sources of basic data extending over many years. They provide demographers, statisticians, epidemiologists, sociologists and public health workers with reference material for enquiries into world or regional mortality phenomena. They also serve as a stimulus to many administrations to remedy lacunae, irregularities and inaccuracies in their own statistics.

The monthly *Epidemiological and Vital Statistics Report* contains current data on general mortality, infant mortality, notifiable diseases, and also special tables on the occurrence of diseases in certain selected countries and large cities.

The contents of these reports may be illustrated by a recent tabulation of general mortality in the *Epidemiological and Vital Statistics Report*. It gives available death rates per 1000 population for countries throughout the world for which statistics are available, noting where the data are incomplete or approximate; and provides figures for the years 1936-38, 1947-49, 1950-52, 1953-55, 1956, 1957, and the quarters of 1956, 1957 and 1958. Other tables show the total number of deaths and death rates per 1 000 000 population, by sex, since 1950; the number of deaths by sex and age-group since 1950; the 1954-1956 average of specific death rates per 1 000 000 population, by sex and age-group; the number of deaths, by sex and by age, in 1954-1956; and the distribution of deaths from various causes in 1954-1956, using the International Classification.

The mortality statistics available in the most complete form for the largest population and longest time are those for Europe. In Europe, the period since 1900 has, however, been characterized by two world wars which in addition to causing a loss of population, and migrations, brought about important changes in territorial boundaries and under-registration of deaths. Moreover, the national censuses have also differed in value. The administration of statistics services has varied in efficiency from country to country; in some, the basic accuracy of population data may even have changed

* For the earlier parts of this account of WHO's work in international health statistics, see: *WHO Chronicle*, 1959, 13, 67, 214, 253, 378, 417.

between one census and the next. For all these reasons an analytical study of the mortality data has sometimes been extremely difficult. Certain general trends in mortality have been evident, however.[1]

There were periods when the number of registered deaths increased to an abnormal extent: such were the years 1904-1908, and again 1924-1927. Except for these periods the death rate declined during the century, being almost halved in some countries. This trend was masked in places by the aging of the population; for the greatest improvement was in infant and child mortality, though there was a marked decline also in the death rates for some middle-aged groups. The result was a higher proportion of people of 60 years of age and over. It became evident that unless new and effective therapeutic agents were discovered and new methods of treatment evolved to combat or retard diseases of old age, there was no possibility of a substantial permanent decrease in the general death rates for the countries which already had a large proportion of old people in their populations.

The expectation of life was increased, the gains made being chiefly concentrated in childhood and early adulthood, and being smaller in countries such as England, France and Sweden where the expectation of life was already high. The maximum gains were at birth, reflecting the great strides made in reducing infant mortality in all the countries of Europe.

The fall in the mortality of pre-school children was also spectacular, the rates in 1950 being less than 30% of the corresponding rates at the beginning of the century. The specific death rates for the other age-groups up to 45 or 50 years were reduced in most countries by roughly half or more. But only small gains were registered for older age-groups. The minimum specific death rates recorded in all countries were for the age-group 10-14 years. The ratio of male to female mortality almost universally exceeded unity for all ages combined (Sweden being the one exception), male babies being more liable to die than female babies. By about 1947, in 13 Western European countries with a total population of about 203 million, there were more than 1 750 000 fewer deaths per year among persons of all ages than would have been expected if the 1900 level of the death rate had remained unchanged.

Mortality could be viewed during the half-century in terms of a selected group of infectious diseases: the typhoid and paratyphoid fevers, scarlet fever, whooping cough, diphtheria, measles, malaria, smallpox and typhus. Mortality from typhoid and paratyphoid fevers declined in practically all European countries; on the whole in a pronounced and steady fashion in one group, which included Belgium, England and Wales, the Netherlands, Sweden and Switzerland; far less markedly in a second group, which included Italy and Spain. The decline was generally attributed to improvements in sanitary conditions through better water supplies, the installation of sewerage systems, greater attention to the hygiene of milk and other foods, and better plumbing and housing. Other factors were better medical care, more hospital facilities, earlier notification of suspected cases, prompter measures by public health authorities on receiving notifications, improvement in the education of the public, greater awareness of the dangers of infection, and, perhaps, antityphoid inoculations (though the part played by inoculation is difficult to assess).

With scarlet fever there was no definite decline in mortality until about 1920. Thereafter it became appreciable, although there were marked fluctuations in some countries; and at the end of the half-century mortality was of the order of between 0.1 and 0.2 per 100 000 inhabitants, having been more than 5 per 100 000 for most European countries at the beginning of the period. The two explanations most frequently advanced for the uniform decline were a change in the virulence of the causative organism and a shift in the incidence of the disease, which now tended to attack older children and adults rather than the younger children among whom it had previously been most frequent.

[1] Pascua, M. (1949, 1950, 1951) Evolution of mortality in Europe during the twentieth century, *Epidem. vital Statist. Rep.*, 2, 64; 3, 32; 4, 36

Whooping cough mortality also declined with remarkable uniformity throughout the period. Except for better medical and nursing care generally, and the use of modern therapeutic agents in combating respiratory complications, nothing specific had been done from a public health point of view to account significantly for this considerable decrease.

Mortality from diphtheria decreased substantially during the half-century. While the introduction of antitoxin could be held to be partially responsible for the decrease in the earlier part of the period, it was difficult to ascribe full responsibility to it. Preventive immunization had reduced mortality to practically nil wherever it was practised on a sufficiently high proportion of children of pre-school and school age.

There was a conspicuous reduction in the mortality from measles. There does not seem to have been any great change in morbidity, but the pattern of distribution may have shifted so that more older children and fewer babies and younger children were affected. Less overcrowding, through improved housing, may have helped. Administration of convalescent or adult serum and the use of gamma globulin were not carried out on a sufficient scale to have had any considerable effect; but this did not apply to the use of sulfa drugs and antibiotics which controlled mortality from the more fatal complications.

Malaria declined also, as the result of improved malaria prophylaxis and of progress in the treatment of patients. DDT and other residual insecticides helped bring about a striking decrease in mortality from this disease towards the end of the period.

Widespread and sustained vaccination stimulated by the two world wars was probably responsible for the great decline in smallpox mortality.

Typhus is a disease closely associated with war, famine, overcrowding and insanitary conditions in general. Not surprisingly, therefore, there were major epidemics during and immediately after the First World War in Poland, Romania, Russia and Serbia; the number of cases in the European part of the USSR from 1918 to 1921 was estimated at no less than 25 million.[2] Typhus mortality went up again, during the Second World War, in central and eastern Europe: but not on any comparable scale. The advent of DDT obviously affected its incidence during the closing months and the aftermath of the conflict.

Mortality from all the diseases considered has thus greatly decreased, in some cases very substantially. It is interesting to observe that the rate of decrease in the mortality from several of these diseases has been remarkably similar in various western European countries which differ, and have differed, a great deal in some of the public health and medical practices usually considered as influencing the behaviour of infectious diseases.

Special studies

Many tables and studies have been based in recent years on the mortality data collected internationally. However, we shall deal here with only two subjects which exemplify the development of international statistics and their utilization, i.e., infant mortality and accident mortality.

Infant mortality

Tables of infant and neonatal deaths per 1000 live births are published periodically in the *Epidemiological and Vital Statistics Report*,[3] and in *Annual Epidemiological and Vital Statistics*. They cover the whole world and, in a recent Report, are given for the years 1936-38, 1947-49, 1950-52, 1953-55, 1956, 1957 and the quarters of 1956, 1957 and 1958. Separate sections are devoted to infant and neonatal deaths.

Infant mortality had started to decline in Europe by about the turn of the century, and in most other countries of the world a little later:[4] in 1876-1880, except in the British

[2] Biraud, Y. (1943) *Bull. Hlth Org. (L.o.N.)*, **10**, 1

[3] *Epidem. vital Statist. Rep.*, 1950, **3**, 126; 1951, **4**, 276; 1952, **5**, 283; 1957, **10**, 723; 1958, **11**, 229

[4] Stouman, K. (1948) *Epidem. vital Statist. Rep.*, **1**, 188

Isles and Scandinavia, infant mortality rates in European countries were over 150 per 1000 live births, being 250 or more per 1000 in Austria-Hungary, southern Germany and Russia. In 1912, when there were rates below 100 per 1000 in the British Isles, the Netherlands, Scandinavia and Switzerland, they were still over 180 in Austria-Hungary, Romania and Russia. In 1932 the area of excessive infant mortality in Europe was confined to Hungary and Romania. In 1946, on the other hand, among countries throughout the world which published statistics on the subject, only four had rates of 160 or over, while none had rates over 185.

Just before the Second World War infant mortality rates of under 50 per 1000 live births were to be found in Australia, Scandinavia, Switzerland, the Netherlands and New Zealand. This group of countries with a very low infant mortality rate was joined immediately after the war by Canada, the United Kingdom and the United States, while in Australia, New Zealand and Sweden the rate had by then fallen to below 30 per 1000.

The immediate effect of the Second World War on infant mortality varied from country to country. In Scandinavia and the United Kingdom it was practically nil; indeed, Sweden, the United Kingdom and the United States experienced their most spectacular fall in infant mortality after 1941. In spite of the hardships it suffered, Finland had a rate above its pre-war level only in 1940, while Iceland and Norway remained below 40 per 1000 except for one year. In France, on the other hand, the rate rose from 65 per 1000 live births in 1937-1939 to 91 in 1940 and 108 in 1945. In Germany, where the rate had fallen from 145 per 1000 in 1919 to 60 in 1938-1939, it rose slowly throughout the war, and in the British Zone of Occupation it was 105 per 1000 in 1946. In Austria, where it had been 70 per 1000 in 1941, it was 162 per 1000 in 1945; but it was back to 81 in 1946.

A general downward trend in infant mortality, in some cases momentarily interrupted by the war, was also observable elsewhere. In Egypt, the rate, which had been 224 per 1000 in 1921-1925, fell to 198 in 1939, rose to 215 in 1943, but fell again to 185 per 1000 in 1946. In Ceylon, the 1931-1935 rate of 182 per 1000 fell to 140 per 1000 in 1945. In India, the rate was 182 per 1000 in 1921-1925, 156 in 1939, 169 in 1944. In Venezuela, it had been over 150 in most years up to 1934, but it fell to 99 in 1945; and in Argentina, where it had been 99 in 1935-1939, it was 81 in 1943-1945.

In most countries immediately after the war, therefore, the infant mortality rate in spite of the ravages of the war became as low as it had ever been, representing constantly increasing control over the hazards surrounding infant life.

Studies appearing in the *Epidemiological and Vital Statistics Report* in 1950,[5] 1951,[6] and 1952 [7] showed that in most European countries the limits to which the more easily preventable infant deaths could be reduced were being reached with rates falling to 30 deaths and less per 1000 live births. This was also the position in certain other countries, particularly Australia, Canada, New Zealand and the United States. Other countries which made returns also generally showed descending rates.

For reasons of brevity, reference has been made only to total infant mortality. Data on the age distribution of infant deaths, however, provide a valuable field of study, and have shown that the reduction of neonatal mortality depends mainly on prenatal care and good obstetrics, and goes hand in hand with reduction of maternal mortality. The reduction of later infant mortality (over one month) depends largely on the control of environmental factors and correct feeding. The institution of health centres and improvement in general public health work have contributed to a more rapid decrease in later infant mortality than in mortality in the first month of life.

Accident mortality

Article 2 of WHO's Constitution stipulates that, in order to achieve WHO's objectives, one of the functions of the Organization shall

[5] Pascua, M. (1950) *Epidem. vital Statist. Rep.*, 3, 132
[6] Pascua, M. (1951) *Epidem. vital Statist. Rep.*, 4, 282
[7] Pascua, M. (1952) *Epidem. vital Statist. Rep.*, 5, 292

be " to promote, in co-operation with other specialized agencies where necessary, the prevention of accidental injuries ".

The importance of accident mortality has increased in recent years. Whereas general mortality has steadily decreased in many parts of the world, the death rate due to accidents remains high, and for many types of accident has gone up. In some countries, accidents among certain groups have become the chief cause of death in childhood and adolescence, killing greater numbers than all other causes combined. The first WHO International Conference of National Committees on Vital and Health Statistics in 1953 accordingly recommended that WHO continue or initiate statistical studies on the problem.

International interest in the subject, in fact, dates back to 1934, when the League of Nations asked governments whether they kept statistics on road accidents and their causes and, if so, on what basis they did so. A Committee for the Unification of Statistics Relating to Road Traffic Accidents was established in 1935, and met in 1936 and 1937; it recommended compilation of statistics in a uniform manner, and the adoption of the International List of Causes of Death for the purpose. After the war, the United Nations Economic Commission for Europe, through its Subcommittee on Road Transport, revived interest in the subject by setting up a Working Party on the Prevention of Road Accidents. The Economic Commission for Asia and the Far East also set up a working party in 1950 to consider, *inter alia*, the problem of accident statistics. WHO's interest has been in accidental deaths of all kinds, the most important of which include those due to motor-vehicle accidents, drowning, poisoning and falls.

The International Statistical Classification of Diseases, Injuries, and Causes of Death gives a dual classification of accidents: according to the external cause, and according to the nature of the resulting injury. In the former classification, which comprises 124 categories, the main division lies between transport accidents and accidents from other causes. The WHO *Epidemiological and Vital Statistics Report* has included statistics of both these kinds of injury [8] for 18 countries throughout the world, using figures based on the Intermediate List of the 1948 International Classification, and adopting the classification by external cause only. These statistics cover deaths from all accidents and—published in separate tables—from transport accidents, with their relationship numerically and proportionately to general mortality; on deaths from accidents, both generally and by categories, according to sex and age; as well as detailed data concerning, for example, deaths from the various kinds of accidental fall and from poisoning, and infant mortality from certain accidental causes.

Accidents are the leading cause of death between the ages of 1 and 19 [9] in most of a group of selected countries throughout the world. In the Netherlands in 1954 they were responsible for 30-40% of all deaths. In childhood, mortality from accidents is highest at the pre-school age; it then falls for schoolchildren, but increases again somewhat in adolescence. Since the beginning of the century, it has decreased in Europe for the pre-school group, in spite of a growing traffic-accident toll, because deaths from drowning and burns and scalds have diminished. It has remained almost level for school-age and adolescent groups, where increasing deaths from traffic accidents have cancelled out the decrease in deaths from other accidental causes.

For countries outside Europe, accidents also constitute an important problem. The highest accident rate of all for girls, in the years 1951-53, was in Ceylon. The rate for both sexes was high in Australia, Canada, Ceylon and the United States. In Canada and the United States about a quarter of all deaths every year among pre-school children, and a third of those among elementary schoolchildren result from accidents of one kind or another. Accidents kill more than twice as many pre-school children as do measles, scarlet fever, whooping cough, diphtheria, dysentery, tuberculosis and polio-

[8] *Epidem. vital Statist. Rep.*, 1956, **9**, 1; 1953, **6**, 259

[9] Swaroop, S., Albrecht, R. M. & Grab, B. (1956) *Bull. Wld Hlth Org.*, **15**, 123

myelitis together. Statistical studies of " total life " or " working life " lost through death from various causes show the great economic effect of accident mortality on a nation's productivity: in 1945 in the United States, for example, accidents replaced heart diseases as the cause of death responsible for the greatest number of working years lost.[10]

In all of 12 selected countries throughout the world, except Ceylon, the accident death rate between the ages of 1 and 19 in 1951-53 was at least twice as much for males as for females, and in Australia, Germany and Sweden it was about three times as much. In the majority of these countries, motor-vehicle accidents were responsible for the largest share of the deaths; but in France and Japan accidental drowning occupied the first position. Deaths from fire and explosion and deaths caused by hot substances occurred much more frequently among females, particularly in Ceylon.

In 8 of the 12 countries, a study of trends in mortality revealed that the specific death rate between the ages of 1 and 19, while remaining practically unchanged in Australia between 1931 and 1951, decreased during the same period in other countries—by about 15% in Switzerland and by between 25% and 30% in Italy, the Netherlands and the United States. If the relative importance of accidental deaths in relation to total deaths is studied, however, there is a noticeable increase, which can be ascribed largely to the more rapid reduction in deaths from other causes. A clear trend towards an increase in deaths from motor-vehicle accidents is discernible, especially in Australia, Canada and Sweden. The decline in the death rate from all accidents is due to the fact that the increasing death rate from motor-vehicle accidents is more than compensated for by the decline in the death rate from other accidental causes.

A WHO Advisory Group on Prevention of Accidents in Childhood met in 1956, and devoted much of its agenda to the statistical aspect of accidents for, as its report said: " Fact-finding is basic to the development of accident-prevention programmes. "[11]

The Group held the view that data on accidents should contain more information regarding age, cause and sex, and should be made available quickly, as they lost much of their value for the preparation of programmes for prevention and for community education when out of date. In other words, routine production of current figures, inaccurate as they might be in detail, helped greatly in prevention. " As in the case of diseases affecting a community, the occurrence of accidents in a given population involves important, but at present ill-understood, relationships between the host, the agent and the environment. In the opinion of the Advisory Group, the epidemiological method offers a scientific approach to the study of accidents and accident prevention. An explanation of causes can be sought in each case through the interaction of the host—the child at risk, the agent—the effective cause of the event, and the environment—the chain of external circumstances culminating in the event. Whereas from the strictly medical point of view the injured child is the primary concern, the epidemiological standpoint requires careful determination not only of the number of events of a certain character which occur in a given category or group of the population, but of the time, the manner, and the place of occurrence, and the relation of these events to the population at risk. " [12] Hence the importance of careful statistical data on accidents. The Advisory Group considered, however, that the international use of mortality figures was limited and that the figures were of greater value locally.

The work of the Group was pursued in a more representative seminar convened by the WHO Regional Office for Europe at Spa, Belgium, in July 1958. Before the seminar a consultant visited a number of countries in Europe, securing further information by means of a questionnaire on the status and extent of accident prevention work. Although the main topics discussed were education and publicity, administrative and legal aspects

[10] Dickinson, F. G. & Welker, E. L. (1948) *What is the leading cause of death?* Chicago (Bureau of Medical and Economic Research, American Medical Association, Bulletin No. 64)

[11] *Wld Hlth Org. techn. Rep. Ser.*, 1957, **118**, 39

[12] *Wld Hlth Org. techn. Rep. Ser.*, 1957, **118**, 8

and medical considerations, fact-finding was an important feature.

Other studies

WHO has taken part in many other mortality studies in connexion with epidemiological investigations of cancer, tuberculosis, quarantinable diseases, etc.

The material on mortality collected and disseminated by WHO constitutes an important world service over and above any particular analyses undertaken by the Organization itself. It ensures continuity in mortality records going back to the early days of the League of Nations. In conjunction with the demographic series published by the United Nations, it also provides an increasingly more complete survey of data essential both for administrators and investigators.

In the annual and monthly reports on epidemiology and health statistics, WHO has managed to issue a number of tables over and above those on general mortality and those forming the subject of special study described in this paper. These tables have presented available world mortality data on such subjects as syphilis, diabetes, gastric and duodenal ulcers, alcoholism, cirrhosis of the liver, congenital malformations, arteriosclerosis, infective and parasitic conditions, pneumonia and bronchitis, suicide, trachoma, leukaemia, leprosy, epilepsy, and malignant tumours of various sites.

Reports of Expert Groups

Methods of radiochemical analysis *

Sources of radioactive contamination have multiplied during the last two decades and it has now become essential for public health workers to have at their disposal reliable analytical methods for the determination of important radioactive elements in various types of sample. Apart from their use in the control of radioactive waste-disposal, such methods are particularly important for assessing possible contamination of water, of food-producing resources and food supplies and in the control and evaluation of internal contamination in man. The procedures worked out in various research centres have not hitherto always been readily accessible to other workers and there has been little to guide health laboratories in the choice of suitable methods. An Expert Committee, convened jointly by the World Health Organization and the Food and Agricultural Organization of the United Nations,[1] has now published a report containing " a selection of basic recommended methods and those thought to be the most practical for laboratories new to radiochemical work ". In most cases two or more methods are given for the determination of each radionuclide, one a highly sensitive method, the others, usually less sensitive and less accurate, but providing more rapid results. Reference is also made to other useful methods. Detailed analytical procedures are described for the determination of tritium, strontium, ruthenium, iodine, cesium, polonium, radon, radium, thorium, uranium, plutonium, and gross radioactivity.

* Joint WHO/FAO Expert Committee on Methods of Radiochemical Analysis (1959) *Report* (*Wld Hlth Org. techn. Rep. Ser.*, No. 173), 116 pages. Price: 5/—, $1.00, or Sw. fr. 3.—. Also published in French and Spanish.

[1] Members of the Joint Committee: Dr L. T. Alexander, USA; Dr C. L. Comar, USA; Dr. J. H. Harley, USA (Rapporteur); Professor Y. Hiyama, Japan (Vice-Chairman); Dr H. Jammet, France; Dr Lidia A. Katchur, USSR; Mr Lars Lund, Norway; Dr A. S. McLean, United Kingdom; Dr C. G. Stewart, Canada (Chairman); Dr C. P. Straub, USA; Mr F. J. Woodman, United Kingdom. Representatives of other organizations: Mr Arve Kjelberg, United Nations Scientific Committee on the Effects of Atomic Radiation; Mr G. W. C. Tait, International Atomic Energy Agency. Secretariat: Dr R. L. Dobson, WHO (Joint Secretary); Dr I. S. Eve, WHO; Mr L. Jeanmaire, France (Consultant); Dr M. F. Milligan, USA (Consultant); Dr R. A. Silow, FAO (Joint Secretary).

In the general section of the report, which precedes the description of these methods, the Committee reviews the various sources of radioactive contamination and discusses the basic principles that have to be taken into account in devising methods of evaluation of environmental contamination and internal contamination of the human body. Brief reference is made to precautions that should be taken to minimize the release of radioactive substances into the environment and to avoid unnecessary exposure of workers or members of the general public. Tables giving the maximum permissible concentrations of radionuclides in air and water—based on the recommendations of the International Commission on Radiological Protection—are also included.

In order to obtain a reliable assessment of radioactive contamination, it is essential that the samples used should be representative. Suitable sampling techniques for ensuring this are recommended by the Committee, with separate consideration of each type of substrate likely to be examined. The report concludes with a discussion of the instrumentation required for carrying out radiochemical analysis, brief indications being given of the particular applications of the different types of equipment available.

Notes and News

Regional Committee for South-East Asia

The twelfth session of the WHO Regional Committee for South-East Asia was held in Kandy, Ceylon, from 23 to 29 September 1959. Representatives of 9 countries were present. The United Nations, FAO and UNICEF, and a number of non-governmental organizations were also represented, and the session was attended by Dr N. I. Grashchenkov, Assistant Director-General of WHO. The following officers were elected: Dr W. A. Karunaratne (Ceylon), Chairman, and Dr U Maung U (Burma), Vice-Chairman.

Dr C. Mani, WHO Regional Director for South-East Asia, presented his report for the period August 1958-July 1959, in which he stressed that, owing to the limited resources available in the Region for public health work, care must be taken to see that the best possible use was made of them. For example, the number of medical schools had been increased and the number of admissions to these schools doubled, but adequate teaching staff had not been provided; this was a false economy, since the result might well be a vast number of inadequately trained doctors. Dr Mani went on to give other examples of the uneconomical use of public health staff and funds in the Region. Doctors and nurses were spending part of their time and energy on work which could be done by clerks or even domestic workers. There were too many different courses for auxiliary medical personnel, whose training should be streamlined. There was an unnecessary and uneconomical tendency to use the resources of maternity hospitals for perfectly normal deliveries, and to give too little encouragement to domiciliary midwifery. Not enough attention was being paid to preventive medicine and health education by the staffs of the rural health centres. There was still a general lack of enthusiasm about improving sanitation. Costly medical equipment, especially X-ray units and other electro-magnetic apparatus, was frequently out of order for lack of proper maintenance, while very few of the health institutions possessing such equipment had properly trained technicians on their staffs. Dr Mani added that such instances of the uneconomical use of resources were not intended to disparage the heroic efforts being made by the countries of South-East Asia to improve their peoples' health against tremendous odds; these efforts had resulted in some expansion of public health programmes despite the economic difficulties involved.

During the period under review, WHO had helped governments in the Region with about 130 field projects employing some 240 field workers. These projects were concerned mainly with the control of communicable diseases, the promotion of rural health services, and the training of many categories of health workers. Every country in the Region now had a malaria eradication programme.

Referring to the tuberculosis research project in Madras for the comparison of home and hospital treatment, Dr Mani said: " We can now hope that the vast majority of cases can be adequately treated at home. This would bring tuberculosis control for the first time well within the resources of countries in South-East Asia and of economically under-developed countries elsewhere." WHO assistance to yaws, leprosy and trachoma control programmes had continued, and a renewed effort had been made to stimulate preparations for a smallpox eradication programme.

Strong WHO and UNICEF support had been given to the development of rural health centres in India and Afghanistan and a small rural health programme had been started in Indonesia. Increasing attention was being paid to sanitation programmes, and a WHO consultant team was to advise the State Government of West Bengal on water supply and sewerage schemes for the city of Calcutta. Child health services and the teaching of paediatrics had made notable progress in India, where a little over a year ago there were only 2 full-time professors of paediatrics. Today there are 6 professors and 4 associate professors of paediatrics in India.

Progress had also been made in the strengthening of national health services and of health education services. As regards medical education, 12 internationally recruited professors had been teaching in various medical faculties in the Region. The WHO-assisted School of Radiography in Ceylon is now to be used for training X-ray technicians from all parts of the Region. During the year, 131 WHO fellowships were awarded to public health staff in the Region.

In the discussion on the Regional Director's report, there was general agreement that the economic situation in the countries of the Region, especially the severe shortage of foreign exchange, was seriously hampering the development of health services. The suggestions contained in the report for making the best use of available resources were endorsed. The development of units for epidemiological investigation in every health department, the revision of present systems of health records in the Region, and measures to prevent accidents in the home were advocated.

The proposed programme and budget for 1961 provided for expenditures of $1 381 000 from the regular WHO budget, and of $1 340 000 from United Nations Technical Assistance funds, $1 068 000 from the Malaria Eradication Special Account, and $4 886 000 from other extra-budgetary funds. The programme and estimates were endorsed by the Committee.

On the subject of the proposed International Health and Medical Research Year, which is to be reconsidered at the Thirteenth World Health Assembly, the Committee doubted that the health administrations of the South-East Asia Region would have the necessary resources in the near future to participate effectively. It considered that the expenditure that would be involved on the part both of national administrations and of WHO might more profitably be made on WHO's field activities, and that the proposed undertaking should not be sponsored by the Organization for the time being.

Satisfaction was expressed at the fact that, following resolutions of the Eleventh World Health Assembly and the eleventh session of the Regional Committee, every country in the Region had taken active measures to plan comprehensive vaccination campaigns wherever smallpox was a major public health problem, or to intensify existing vaccination or revaccination services in those countries where smallpox had in the past been under control. Urgent action for the eradication of the disease from the Region was advocated.

The Committee considered the question of the new Regional Office building, and expressed the hope that this building would be completed in time for the Fourteenth World Health Assembly, which was expected to be held in New Delhi early in 1961.

There was a discussion on the Malaria Eradication Special Account, to which three countries in the Region had contributed. Delegates from two other countries announced that their governments had agreed to contribute. It was recognized that

the countries of the Region were already committed to heavy expenditure on malaria eradication within their own borders and so could not give substantial financial help to the WHO fund. Nevertheless, such small contributions as they could make would be a token of their support of the world-wide effort for malaria eradication.

Three meetings were devoted to technical discussions on "The role of immunization in communicable disease control". It was agreed that high priority should be given to the eradication of smallpox through mass vaccination campaigns organized on a nation-wide basis. The administrative, technical and budgetary aspects of smallpox eradication were discussed in detail.

A recommendation was made that as soon as the major problem of smallpox is brought under control, mass immunization campaigns against whooping cough, diphtheria, tetanus, typhoid fever and tuberculosis should be started. In the meantime, immunization programmes against the latter diseases should, wherever possible, be carried out through the existing medical and public health services. A regular schedule for immunizations of children from birth to school-leaving age was recommended.

In the general discussion of the various diseases considered, stress was laid on the importance of collecting essential data on the extent and pattern of these diseases by the establishment of epidemiological units; only thus can an immunization programme be planned and undertaken in an effective and economical manner. WHO is helping in the establishment of epidemiological units, by providing consultants and granting fellowships.

The question of the date of the Committee's next session was left open, pending a final decision on the date and place of the Fourteenth World Health Assembly. The Regional Director was therefore authorized to fix the date of the 1960 session, in consultation with the Chairman of the Regional Committee, notifying the Member States of the Region in due course.

Regional Committee for Europe

The WHO Regional Committee for Europe met for its ninth session in Bucharest, Romania, from 8 to 11 September 1959. It was attended by representatives of 28 Member States of the Region, and observers from a number of governmental and non-governmental international organizations. Dr M. G. Candau, Director-General of WHO, was present at the concluding meetings of the session.

The Committee elected the following officers: Professor V. Marinescu (Romania), Chairman; Dr J. F. Goossens (Belgium) and Dr A. Engel (Sweden), Vice-Chairmen; Dr Georges Belios (Greece), Rapporteur.

In his report for the period July 1958 to June 1959, Dr P. J. J. van de Calseyde, WHO Regional Director for Europe, stated that the leading WHO activity in the Region was still the education and training of personnel, through fellowships, training courses, seminars and the provision of visiting lecturers. Other traditional activities had been continued, including the control of communicable diseases, notably tuberculosis and trachoma. Increased attention had been paid to rural health activities, which were of fundamental importance since so large a proportion of the populations of the Region lived in rural areas (84% in Yugoslavia, 79% in Turkey, 77% in Morocco and Romania, 75% in Bulgaria, 69% in Poland and Portugal, 63% in Greece and Spain, etc.).

In the field of environmental sanitation, attention continued to be concentrated on the related problems of water supply, waste disposal and water pollution. Air pollution was also becoming a serious problem, as well as protection against ionizing radiation, which had been the subject of special international training courses.

There had been a marked increase in malaria eradication activities and in WHO assistance to certain countries for this purpose. In most of the malarious areas of the Region, the surveillance stage had been reached, but a special effort was needed to achieve total eradication before further mosquito resistance to insecticides developed, or interest waned.

Other activities which had received particular attention were mental health, maternal and child health, and nursing. The aim of the nursing programme was to develop complete family services, combining public health and home nursing, with increasing emphasis on health education, mental health, and rehabilitation. Fellowships for studies in public health, nursing education and nursing administration had been granted to nurses from 6 countries in the Region.

The increased proportion of aged persons in most European populations presents many problems to the public health authorities. During the year under review, an advisory group met to study this problem and to discuss the planning and organization of medical care for the aged.

In addition to these traditional programmes, certain newer activities had been encouraged, including investigations into cardiovascular disease and cancer control, and epidemiological research into other chronic and degenerative diseases. For these studies to be wholly successful, statistical and epidemiological activities would have to be further developed.

Concluding his report, Dr van de Calseyde welcomed the increasing co-operation of certain Member States which had recently resumed active participation in the Organization's work, including Czechoslovakia, Romania and the USSR. All were participating in the fellowships programme and other inter-country activities.

The budget proposed for the 1961 programme provided for the use of some $1 485 000 from the regular WHO budget, $300 000 from United Nations Technical Assistance funds, and $1 470 000 in anticipated contributions from UNICEF for joint programmes. These estimates were endorsed by the Committee with certain minor adjustments.

In the discussions on the 1961 programme, the importance of hospital administration was mentioned, and the wish was expressed that a course on this subject be organized in the Russian language. New activities which had not yet found a place in the regional programme were advocated, including work on epidemic hepatitis and rheumatic diseases. The Regional Director was also asked to pay increased attention to the international co-ordination of research.

The rehabilitation of physically and mentally handicapped persons—who account in Europe for at least 10% of the population of working age—was mentioned as a problem of great urgency. The Regional Director was asked to provide specialized training in rehabilitation, and to study means of integrating rehabilitation services within the general system of medical care.

The Committee noted the endorsement by the Twelfth World Health Assembly of a world-wide programme for safe and adequate water supplies. In view of the relatively high standard of domestic water supplies in most European communities, it was hoped that the countries of the Region would play a leading part in furthering the programme by providing experts and training facilities in this field. Waste disposal and water pollution, which are growing problems in Europe, were cited as needing parallel consideration.

On the subject of atomic energy, the Committee noted with regret that health administrations were often not consulted or kept informed when atomic installations were planned, and that there was unnecessary exposure to radiation as a result of the indiscriminate use of X-rays as well as radioisotopes. It was considered that WHO could perform a useful service by facilitating the exchange of information on standards of radiation protection, and on principles for modern legislation in this field. Research and further training courses on radiation and its dangers were also advocated.

A plan was adopted for the total eradication of malaria from the Region by 1962 at the latest.

The Committee expressed interest in the holding of a well-planned International Health and Medical Research Year with clearly defined aims and objectives, though some representatives doubted the usefulness of such an enterprise.

Technical discussions were held on " The place of mental health in a public health programme ". In the course of these discussions, the following recommendations were made: out-patient and domiciliary mental health services should be considerably extended; district dispensaries directed by psychiatrists should be established; psychiatric departments should form an integral part of all general hospitals; adequate training in psychiatry and psychology should be provided for all medical practitioners, medical students, nurses and other professional health workers; priority should be given to the care of sub-normal and physically handicapped children, to the mental health problems of women in pregnancy and childbirth, and to those of young couples on the threshold of marriage and parenthood; special attention should also be paid to the mental health problems of the aged; a careful study of housing conditions should be made to ensure the provision of adequate space, well-balanced lighting, and privacy; the general improvement of social conditions and the provision of adequate material security should be considered as of

special importance in the prevention of mental ill-health. The participants supported the view that early treatment can be regarded as the beginning of prevention, and that the extension of mental health practice will be possible only if mental health is given priority in public health programmes.

The Committee confirmed its decision to hold its tenth session in Copenhagen and its eleventh session in Luxembourg.

Regional Committee for the Eastern Mediterranean

Both Sub-Committee A and Sub-Committee B of the ninth session of the WHO Regional Committee for the Eastern Mediterranean met in September this year.

Sub-Committee A, with 13 Member States represented, met at the Eastern Mediterranean Regional Office, Alexandria, United Arab Republic, from 14 to 19 September. Dr M. O. Shoib (United Arab Republic) was elected Chairman of this Sub-Committee; Brigadier M. Sharif (Pakistan) and Dr Hassan Nassif (Saudi Arabia) were Vice-Chairmen.

Sub-Committee B, with representatives from 4 Member States, met from 28 to 30 September at WHO Headquarters, Geneva. Professor M. Etemadian (Iran) was elected Chairman. Médecin-Colonel P. Faure (France), who was elected Vice-Chairman, was also designated by both Sub-Committees to co-ordinate and harmonize their decisions. The resolutions adopted by the two Sub-Committees were in the majority of cases identical.

In the discussions on the annual report of Dr A. H. Taba, WHO Regional Director for the Eastern Mediterranean, which covered the period July 1958-June 1959, the consensus was that the programme was developing along satisfactory lines. Particular appreciation was expressed of the increasing emphasis on education and training, the control and eradication of communicable diseases, the improvement of environmental sanitation, and the promotion of maternal and child health in all its aspects. The extension of inter-country and inter-regional undertakings was also approved. A continuing evaluation of health activities as an integral part of national health programmes was urged, as well as co-ordination and co-operation at the regional level in all health matters.

Research, particularly on bilharziasis and malaria, and on the health aspects of radiation, was considered essential, and it was thought that an investigation of the use of local medicinal herbs also might be of value.

The development of vital and health statistics was considered essential to progress in all fields of health, and the value of long-term national health programmes was generally endorsed.

In the discussions on technical matters, the need for countries to undertake programmes for malaria eradication with added vigour was stressed. Nine countries of the Region had already made initial contributions to the Malaria Eradication Special Account, and further contributions were urged. The problem of malaria vectors in wells used for drinking-water was raised and it was recommended that a pilot study should be undertaken to find the most suitable method of dealing with it. The Regional Director was requested to consider the establishment of inter-country field malaria eradication evaluation teams. Stress was laid on the need for appropriate legislative measures, which would endow the administrative machinery of national malaria eradication services with all necessary authority and responsibility for the effective direction of malaria eradication campaigns.

With regard to smallpox, it was considered that mass vaccination campaigns should be centrally administered and co-ordinated, and dried smallpox vaccine used. Research to devise a cheaper vaccine was recommended.

Governments of neighbouring countries were recommended to conclude agreements for simultaneous vaccination programmes in boundary zones in order to create " immune barriers " and prevent the importation of smallpox, as well as to establish efficient quarantine control services.

Nutrition was recognized as a major problem in the Region, particularly in view of the increasing population. Not only the medical, but also the agricultural and economic, aspects of this problem were important. The need for health education in this field, particularly where habits and traditions prevented populations from using readily available and abundant foods, was emphasized, and nutrition training programmes

were advocated. A survey of diets was recommended, so that the extent of the problem might be assessed.

The resolution of the Twelfth World Health Assembly on community water supplies was noted with satisfaction, and countries of the Region were urged to contribute to the special account established by WHO in this connexion. The need in most parts of the Region for adequate and safe water supplies was overwhelming, although in two countries a high percentage of the inhabitants were reportedly supplied with pure piped water. The question of waste water disposal was also considered to need special attention. It was recommended that all countries of the Region make a special effort to develop rational water supply programmes with due attention to the administrative, legal, economic, fiscal and technical problems involved.

The education of health personnel at all levels, and particularly nurses, in the public health aspects of radiation was considered of paramount importance. The training of specialists in the protection of the public against the harmful effects of ionizing radiation was also urged, as well as research on the somatic and genetic changes due to radiation. It was recommended that Member States take measures to ensure the safe disposal of radioactive wastes and to provide for the inspection of all institutes and establishments in which ionizing radiation was utilized.

The question of khat was also discussed. It was considered that legislation against the use of this stimulant should perhaps not be enforced until its addiction-forming qualities were proved and the social, medical, legal and economic implications explored.

The question of the proposed International Health and Medical Research Year was discussed and it was the general feeling that it should be deferred for the present.

The proposed programme and budget for the Eastern Mediterranean Region for 1961 was endorsed. The estimates provided for the use of $1 800 000 from the regular budget of WHO, some $900 000 from United Nations Technical Assistance funds, and approximately $1 000 000 from the Malaria Eradication Special Account. The increasing expenditure on fellowships, university programmes and mental health activities was noted with satisfaction.

Sub-Committee A held technical discussions on ancylostomiasis which is one of the most important parasitic diseases in the Region. A survey of the basic factors involved in the epidemiology of the disease, the improvement of sanitation in the affected areas, and the development of safe remedies for mass treatment were recommended. It was suggested that measures to combat this problem should be included in national schemes for economic development.

The technical discussions at the meeting of Sub-Committee B were on the subject of poliomyelitis. It was noted that serological surveys had confirmed the endemicity of poliomyelitis in the Eastern Mediterranean Region, and that the disease had sometimes reached epidemic proportions in certain countries of the Region during the past ten years. Member States were urged to make poliomyelitis vaccination compulsory by law and to promote a system of reporting the disease in order to facilitate the accumulation of accurate statistical data.

Both Sub-Committees next year will hold technical discussions on the subject of tuberculosis control, with particular reference to domiciliary treatment. Sub-Committee A will meet in Tunis; the meeting-place of Sub-Committee B has not yet been decided.

Regional Committee for the Western Pacific

The WHO Regional Committee for the Western Pacific held its tenth session in Taipeh, China (Taiwan), from 16 to 22 September 1959. The session was attended by representatives of 9 countries in the Region, and of 5 other countries responsible for territories in the Region. Representatives of the United Nations, UNICEF, the Technical Assistance Board and a number of non-governmental organizations were also present. The Committee elected the following officers: Dr C. K. Chang (China), Chairman; Dr E. Valencia (Philippines), Vice-Chairman; Dr L. J. Clapham (United Kingdom) and Dr Lê-Cuu-Truong (Viet Nam), Rapporteurs.

In his annual report covering regional activities from July 1958 to June 1959, Dr I. C. Fang, WHO Regional Director for the Western Pacific, said that during the year under review the general

WHO policy of strengthening public health administrations had been maintained. Emphasis had continued to be placed on the training of all categories of health personnel, the control of communicable diseases, and the development of special services such as maternal and child health, nursing, and environmental sanitation.

After almost seven years of research and study, WHO and the Government of the Philippines were working on a plan to integrate bilharziasis control into the national health programme of that country. Yaws projects were progressing towards complete control of the disease, as improved rural health teams extended their activities to areas formerly deprived of medical care.

Member States had shown increasing interest in the possibility of the hygienic treatment of refuse and night-soil for the production of fertilizers. Full-scale composting plants were being installed in countries where WHO had assisted pilot composting projects.

There was growing interest in vital and health statistics and a number of governments had indicated willingness to participate in a regional seminar on the subject in 1960. The hospital records project in Singapore was developing into a medical statistics project aimed at improving vital and health statistics throughout Singapore; a project to reorganize and strengthen health statistical services in Viet Nam was expected to start early in 1960.

Five WHO-assisted health projects had been successfully completed and the international staff had been withdrawn: yaws control in Laos; nursing education in Japan and the Federation of Malaya; midwifery training in the Philippines; and the exchange programme between the London School of Hygiene and Tropical Medicine and the University of Malaya.

Despite these encouraging developments, there were still a number of problems confronting public health authorities in the Region. Dr Fang cited in particular the shortages of personnel and funds which often resulted in ineffective administration. In some countries the shortage of personnel was "serious enough to threaten the success of such vast undertakings as malaria eradication". The long-term financing of national health projects was another major problem, and Dr Fang called the attention of governments "to the danger of too much reliance on foreign aid, as this may lead to the development of programmes which the countries can hardly hope to continue".

The Committee endorsed the programme and budget estimates for the Region for 1961. These provided for expenditures of $1 585 000 from the regular WHO budget, $640 000 from the Malaria Eradication Special Account, $697 000 from United Nations Technical Assistance funds, and anticipated extra-budgetary funds to the amount of $559 000.

The Committee noted with concern that *Anopheles minimus flavirostris*, the chief malaria vector in the Philippines, had become resistant to dieldrin with the result that transmission of malaria was recurring in several areas where complete interruption had earlier been achieved. It also noted that there had been a disappointing response to the appeal for contributions to the Malaria Eradication Special Account. Governments were urged to ensure that personnel, money and material would be available for malaria eradication, and that the progress of their eradication campaigns would be rigorously assessed so that speedy action might be taken to counteract any unexpected difficulty. The Regional Director was asked to keep governments informed of any further case of resistance arising in the Region and to circulate at the earliest possible moment information on the results of trials of medicated salt as a malaria suppressive.

On the subject of environmental sanitation, the Committee recommended that the health authorities of Member States prepare a long-term programme for the development of community water supplies. This programme should include small water-supply projects for rural areas.

In view of the divergent opinions expressed at the session concerning the proposed International Health and Medical Research Year, the Committee decided to transmit the minutes of its discussion on this subject to the Director-General.

The Committee noted that smallpox eradication campaigns had not yet been started in all the countries of the Region where endemic foci existed. It stressed the urgency of achieving world-wide eradication and recommended that

the health administrations of the countries where the disease was still present should initiate eradication programmes as soon as possible, using a stable potent vaccine.

The technical discussions were on the subject of " Tuberculosis control ". The importance of health education and BCG vaccination in the prevention of tuberculosis was stressed. It was agreed that in BCG programmes a wet vaccine should be used where practicable, although in areas difficult of access freeze-dried vaccine would have to be used. While it was the opinion of the participants that chronic cases of infectious tuberculosis should ideally be segregated, it was recognized that this step was not always possible and that continued domiciliary treatment with antituberculosis drugs was the best alternative.

It was agreed that prevalence surveys were desirable, since mortality rates were no longer adequate to assess the tuberculosis problem in a community, and morbidity figures based on notifications were often inaccurate. The data acquired in prevalence surveys should enable efforts to be concentrated on those areas where prevalence was highest; for cases found during surveys, domiciliary treatment should be started through existing health agencies. The importance of using standard survey methods that would permit international comparability of the findings was stressed. It was the general opinion that the new methods of tuberculosis control had made control programmes practicable in areas where they would previously have been too costly for implementation. The subject of the technical discussions at the Committee's 1960 session will be " The organization and administration of rural health services ".

The Regional Committee for the Western Pacific will hold its eleventh session in Manila, Philippines, in 1960.

Director-General's term of office extended

Dr M. G. Candau, Director-General of WHO, has accepted the offer of the Twelfth World Health Assembly to extend his term of office for a further three years. Dr Candau was appointed Director-General of the Organization in 1953, and his present contract was due to expire on 21 July 1960. At the Twelfth World Health Assembly last May, a resolution was passed expressing deep appreciation of his competent and devoted leadership and offering to renew his contract until July 1963 " to assure further successful development of the Organization ".

Venereal infections and treponematoses

Since the WHO Expert Committee on Venereal Infections and Treponematoses met in London in 1952,[1] there have been a number of developments in this field. New technical knowledge has offered further possibilities for the control of venereal infections and eradication of the endemic treponematoses, particularly yaws. On the other hand, penicillin is becoming less effective against gonorrhoea owing to the growing resistance of the gonococcus to this antibiotic, while penicillin reactions appear to be on the increase. Moreover, although syphilis a few years ago declined in many parts of the world to 90-95% of its immediate post-war level, there has recently been an upward trend in the incidence of the disease in some countries.

A WHO Expert Committee on Venereal Infections and Treponematoses met in Geneva, from 21 to 26 September 1959, to discuss these and related problems, including the development of international research in this field and the treatment of seafarers for venereal infections under the Brussels Agreement.

An account of the Committee's work will be published in the Chronicle when its report appears.

Transfer of Tuberculosis Research Office

The Tuberculosis Research Office of WHO has been transferred from Copenhagen, where it was established in 1949, to WHO Headquarters in Geneva. This has been done in order to centralize the Organization's tuberculosis programme. Part of the staff of the Research Office will

[1] *Wld Hlth Org. techn. Rep. Ser.*, 1953, 63

continue, as before, to carry out field work, including prevalence surveys of tuberculosis and programmes of treatment with the new anti-tuberculosis drugs. Studies will continue on the applicability of simple, economical methods for the diagnosis and treatment of tuberculosis patients without hospitalization wherever possible.

The Tuberculosis Research Office was originally established to analyse the data assembled during the BCG vaccination programme launched by the Danish Red Cross in 1947. This programme was subsequently extended, with the help of the Norwegian Relief for Europe, the Swedish Red Cross and UNICEF, and became the International Tuberculosis Campaign (ITC). The ITC assisted vaccination programmes in 23 countries before officially turning over its activities to WHO and UNICEF in 1951. The work has been continued ever since by these two agencies; since the launching of the original programme, 245 million children and young adults have been tested for tuberculosis and 92 million vaccinated in 47 countries. This vast enterprise has been supported since 1949 by the work of the Tuberculosis Research Office in research, training and statistics.

People and Places

Water supply for Calcutta

In India the area of endemic cholera falls mainly within the State of West Bengal with its centre in Greater Calcutta. The disease is endemic throughout the year with peak periods from March to June. From time to time it assumes epidemic form, as in 1958 when there was an outbreak resulting in almost 5000 cases in Calcutta City alone. Unsatisfactory water supplies and lack of sewage disposal facilities are the principal reasons for this situation.

The difficulty of supplying safe water and providing drainage in this area can be gauged from the fact that Calcutta has, over the years, become a vast industrial centre sprawling along the river Hooghly for about forty miles with a depth of three to five miles on either side of the river. There are over thirty municipalities or local bodies in the area, including the Corporation of Calcutta, which are independent of one another and have developed their own water supply and sanitary arrangements. Piped water supplies are limited mainly to Calcutta City and to Howrah. Elsewhere the water is generally obtained from tube wells of various sizes, and similar wells recently had to be sunk in Calcutta City itself to increase the water supply.

In Calcutta City the regular water system supplies both filtered water and crude water from the river. The latter is not, of course, intended for human consumption but, since the filtered water is supplied intermittently, people in many places use the crude water for household purposes and thus endanger their health.

At the request of the Government of India, WHO has sent a team of consultants to examine the water supply situation in Calcutta and to recommend measures for its improvement. The team will have to seek solutions not only to the formidable engineering problems involved in finding, developing and treating an adequate and dependable source of fresh water, but also to the very great political and financial problems inherent in establishing a metropolitan board or organization.

The WHO team consists of four leading experts in the fields of water-supply engineering, public administration, and epidemiology. The Chairman is Dr A. Wolman, Professor Emeritus of Sanitary Engineering at Johns Hopkins University, Baltimore, Md., who has wide experience in planning for the development and utilization of water resources in different parts of the world. Among the governments to which he has acted as consultant are those of Brazil, Ceylon, Chile and Israel.

The other engineer on the team is Mr H. F. Cronin who has been Chief Engineer of the London Metropolitan Water Board for the past twenty years, and thus has special knowledge of the problems of hydraulic engineering in a large

urban area. He has been President of the Institution of Civil Engineers and of the Institution of Water Engineers in London.

Public administration is represented by Dr L. Gulick, President of the Institute of Public Administration and Director of the Bureau of Municipal Research, New York, and former Eaton Professor of Municipal Science and Administration at Columbia University. He has been employed as public administration consultant by the United States and other governments.

The epidemiologist on the team is Dr R. Pollitzer, of the George Williams Hooper Foundation, University of California Medical Center, San Francisco. Dr Pollitzer has long been associated with international health work, and for several years was a staff member of WHO. He is the author of the WHO monographs *Plague* and *Cholera*.

Live poliovirus vaccines

By far the most extensive trials of live poliovirus vaccines are those in progress in the USSR, where the number of children vaccinated with the strains developed by Dr Albert Sabin now exceeds 6 million. Favourable reports of the trials were presented at the Conference on Live Poliovirus Vaccines held in Washington, D. C., in June 1959.[1] If these trials meet the criteria formulated by the WHO Expert Committee on Poliomyelitis,[2] it seems that the public health application of the vaccines may be feasible.

Dr Dorothy L. Horstmann therefore recently went to the USSR, Czechoslovakia, and Poland, as an impartial observer, to study the large-scale field trials carried out with the live vaccines in all three countries. Dr Horstmann holds senior appointments at Yale University in the Communicable Disease Service of the Paediatric Department and in the Section of Epidemiology and Preventive Medicine. She has been engaged for many years in epidemiological and virological studies on poliomyelitis, and has recently undertaken both field and laboratory studies on live poliovirus vaccines.

Malariologist for Turkey

Dr Carlos Balestrini, of Venezuela, will serve as malariologist on a WHO malaria eradication team in Turkey. The team will also include an entomologist, a sanitary engineer, a sanitarian, and a laboratory technician. Malaria control operations in Turkey started in 1952, and the internationally assisted eradication campaign began in 1956 under an agreement between the Turkish Government, UNICEF and WHO. New legislation has been prepared by the Government to facilitate the campaign, and two short-term consultants were supplied by WHO to help train Turkish doctors in eradication techniques.

Dr Balestrini received his basic medical training in Rome and Palermo, Italy, and later obtained a diploma in tropical medicine at Maracay, Venezuela. He has served for five years as Chief Physician of the Malaria Eradication Service for the Venezuelan states of Trujillo and Merida. He has also been in charge of malaria eradication courses at Maracay and in Mexico.

[1] See *WHO Chronicle*, 1959, **13**, 402.
[2] *Wld Hlth Org. techn. Rep. Ser.*, 1958, **145**

CORRIGENDUM

Vol. 13, No. 11

PEOPLE AND PLACES

p. 430, right-hand column, item headed *Urbanization survey*, lines 2-4
delete Office of the High Commissioner for Hygiene and Public Health
insert Ministry of Health

International Non-Proprietary Names for Pharmaceutical Preparations

In accordance with paragraph 7 of the Procedure for the Selection of Recommended International Non-Proprietary Names for Pharmaceutical Preparations,[1] notice is hereby given that the following are selected as recommended international non-proprietary names.

The inclusion of a name in the lists of recommended international non-proprietary names does not imply any recommendation for the use of the substance in medicine or pharmacy.

RECOMMENDED INTERNATIONAL NON-PROPRIETARY NAMES (*Rec. I.N.N.*): LIST 3[2]

Recommended International Non-Proprietary Name (Latin, English)	*Chemical Name or Description*
acenocoumarolum acenocoumarol	3-[α-(4-nitrophenyl)-β-acetylethyl]-4-hydroxycoumarin
acepromazinum acepromazine	2-acetyl-10-(3-dimethylaminopropyl)phenothiazine
acetarsolum acetarsol	3-acetamido-4-hydroxyphenylarsonic acid
acetazolamidum acetazolamide	2-acetamido-1,3,4-thiadiazole-5-sulfonamide
acetylcholinii chloridum acetylcholine chloride	2-acetoxyethyltrimethylammonium chloride
acidum ascorbicum ascorbic acid	3-oxo-L-gulofuranolactone (enolic form)
acidum edeticum edetic acid	ethylenediamino-*N*,*N*,*N*′,*N*′-tetra-acetic acid
acidum folicum folic acid	*N*-[4′-({[2-amino-4-hydroxy-6-pteridyl]methyl}amino) benzoyl]-L-(+)-glutamic acid
acidum iophenoicum iophenoic acid	α-(3-hydroxy-2,4,6-triiodobenzyl)-butyric acid
acidum nicotinicum nicotinic acid	pyridine-3-carboxylic acid
adipiodonum adipiodone	adipic acid bis-(2,4,6-triiodo-3-carboxyanilide)
aethisteronum ethisterone	17α-ethynyl-17β-hydroxy-3-oxoandrost-4-ene
aethylis biscoumacetas ethyl biscoumacetate	3,3′-carboxymethylene-bis(4-hydroxycoumarin) ethyl ester

[1] *Off. Rec. Wld Hlth Org.*, 1955, **60**, 3 (Resolution EB15.R7)

[2] Previous lists of recommended international non-proprietary names can be found in *Chron. Wld Hlth Org.* 1955, **9**, 185; *WHO Chronicle*, 1959, **13**, 106.

Recommended International Non-Proprietary Name (Latin, English)	*Chemical Name or Description*
aldosteronum aldosterone	18-oxocorticosterone
ambenonii chloridum ambenonium chloride	*N,N′*-bis-(2-diethylaminoethyl)oxamide bis-2-chlorobenzyl chloride
ambucainum ambucaine	*β*-diethylaminoethyl 4-amino-2-butoxybenzoate
ambucetamidum ambucetamide	2-(di-*n*-butylamino)-2-(*p*-methoxyphenyl)acetamide
aminitrozolum aminitrozole	2-acetamido-5-nitrothiazole
aminometradinum aminometradine	1-allyl-3-ethyl-6-amino-2,4-dioxo-1,2,3,4-tetrahydropyrimidine
aminopterinum natricum aminopterin sodium	sodium 4-aminofolate
amiphenazolum amiphenazole	2,4-diamino-5-phenylthiazole
amisometradinum amisometradine	6-amino-1,2,3,4-tetrahydro-3-methyl-1-methylallylpyrimidine-2,4-dione
amphetaminum amphetamine	(±)-2-amino-1-phenylpropane
atropini methonitras atropine methonitrate	methonitrate of (±)-tropanyl 2-hydroxy-1 phenylpropionate
azacyclonolum azacyclonol	α,α-diphenyl-α-piperid-4-yl-methanol
barbitalum barbital	5,5-diethylbarbituric acid
barbitalum natricum barbital sodium	sodium derivative of 5,5-diethylbarbituric acid
bemegridum bemegride	4-ethyl-4-methyl-2,6-dioxopiperidine
benactyzinum benactyzine	2-diethylaminoethyl benzilate
benzatropini methanesulfonas benzatropine methanesulfonate	tropine benzhydryl ether methanesulfonate
benzonatatum benzonatate	2-(ω-methoxyoctaethyleneoxy)ethyl *p*-butylaminobenzoate
bietamiverinum bietamiverine	2-diethylaminoethyl α-phenyl-α-piperidinoacetate
bromazinum bromazine	{2-(*p*-bromodiphenylmethoxy)ethyl}dimethylamine
buclizinum buclizine	1-(4-chlorobenzhydryl)-4-(4-*tert*.butylbenzyl)piperazine
busulfanum busulfan	1,4-dimethanesulfonoxybutane
calciferolum calciferol	9,10-secoergosta-5,7,10(19),22-tetraene-3-ol (vitamin D_2)
calcii saccharas calcium saccharate	calcium D-glucarate

Recommended International Non-Proprietary Name (Latin, English)	*Chemical Name or Description*
carbazochromi salicylas carbazochrome salicylate	adrenochrome monosemicarbazone sodium salicylate complex
carbimazolum carbimazole	1-ethoxycarbonyl-3-methyl-2-thioimidazole
carbinoxaminum carbinoxamine	2-dimethylaminoethoxy-2-pyridyl-4-chorophenylmethane
carzenidum carzenide	4-carboxybenzenesulfonamide
cetomacrogolum 1000 cetomacrogol 1000	polyethylene glycol 1000 monocetyl ether
chiniofonum chiniofon	mixture of four parts by weight of 7-iodo-8-hydroxyquinoline-5-sulfonic acid and one part by weight of sodium bicarbonate
chlorambucilum chlorambucil	*p*-di-(2-chloroethyl)aminophenylbutyric acid
chlorbetamidum chlorbetamide	*N*-(2,4-dichlorobenzyl)-*N*-(dichloroacetyl)ethanolamine
chlordimorinum chlordimorine	4-{3-(3-chlorodiphenyl-4-oxy)propyl}morpholine
chlorhexidinum chlorhexidine	1,6-bis-(*p*-chlorophenyldiguanido)hexane
chlorisondamini chloridum chlorisondamine chloride	4,5,6,7-tetrachloro-2-(trimethylammoniumethyl)-*N*-methylisoindoline dichloride
chlormerodrinum chlormerodrine	(3-chloromercuri-2-methoxypropyl)urea
chlorobutanolum chlorobutanol	1,1,1-trichloro-2-methylpropan-2-ol
chlorocresolum chlorocresol	6-chloro-3-hydroxytoluene
chloroprocainum chloroprocaine	β-diethylaminoethyl 2-chloro-4-aminobenzoate
chloroquinum chloroquin	7-chloro-4-(4′-diethylamino-1′-methylbutylamino)quinoline
chlorotrianisenum chlorotrianisene	tri-(*p*-methoxyphenyl)chloroethylene
chlorphenaminum chlorphenamine	3-(*p*-chlorophenyl)-3-(2-pyridyl)-propyldimethylamine
chlortetracyclinum chlortetracycline	7-chloro-4-dimethylamino-1,4,4a,5,5a,6,11,12a-octahydro 3,6,10,12,12a, pentahydroxy-6-methyl-1,11-dioxonaphtacene-2-carboxyamide
cholinii chloridum choline chloride	2-hydroxyethyltrimethylammonium chloride
cinnofuradionum cinnofuradione	1,2-dihydro-1,2-(tetrahydrofurfuryl-1,3-dioxopropylene)benzo(*c*) cinnoline
conessinum conessine	an alkaloid obtained from the seeds of *Holarrhena antidysenterica* L.
crotamitonum crotamiton	*N*-ethyl-*N*-*o*-toluylcrotonamide

Recommended International Non-Proprietary Name (Latin, English)	*Chemical Name or Description*
cryofluoranum cryofluorane	1,2-dichloro-1,1,2,2-tetrafluoroethane
cyclomethycainum cyclomethycaine	3-(2-methylpiperidino)propyl *p*-cyclohexyloxybenzoate
cycloserinum cycloserine	4-aminoisoxazolidin-3-one
cycriminum cycrimine	1-phenyl-1-cyclopentyl-3-piperidinopropan-1-01
demecolcinum demecolcine	deacetylmethylcolchicine
deserpidinum deserpidine	11-desmethoxyreserpine
desoxycortonum desoxycortone	21-hydroxy-3,20-dioxopregn-4-ene
dextranum dextran	polysaccharide of high molecular weight, produced by the action of *Leuconostoc mesenteroides* on saccharose
dibrompropamidinum dibrompropamidine	1,3-bis-(4-amidino-2-bromophenoxy)propane
dichlorophenum dichlorophen	di-(5-chloro-2-hydroxyphenyl)methane
dichloroxylenolum dichloroxylenol	2,4-dichloro-3,5-dimethylphenol
dicycloverinum dicycloverine	β-diethylaminoethyl cyclohexylcyclohexanecarboxylate
diethylstilboestrolum diethylstilboestrol	*trans*-3,4-bis-(4-hydroxyphenyl)hex-3-ene
digoxinum digoxin	glycoside obtained from the leaves of *Digitalis lanata* Ehrh.
dihexyverinum dihexyverine	2-piperidinoethyl 1-cyclohexylcyclohexanecarboxylate
dihydralazinum dihydralazine	1,4-dihydrazinophthalazine
dimethoxanatum dimethoxanate	β-dimethylaminoethoxyethylphenothiazine-10-carboxylate
dioxethedrinum dioxethedrin	1-(3,4-dihydroxyphenyl)-2-ethylaminopropan-1-01
diphemanili methylsulfas diphemanil methylsulfate	*N,N*-dimethyl-4-piperidylidenediphenylmethane methylsulfate
diphenylpyralinum diphenylpyraline	*N*-methylpiperidyl 4-benzhydryl ether
dipyrocetylum dipyrocetyl	2,3-diacetoxybenzoic acid
dycloninum dyclonine	*p*-butoxy-3-piperidinopropiophenone
ecothiopati iodidum ecothiopate iodide	S-2-dimethylaminoethyl-0,0-diethylphosphorothiolate methiodide
ectylurea ectylurea	2-ethyl-*cis*-crotonylurea

Recommended International Non-Proprietary Name (Latin, English)	*Chemical Name or Description*
edrophonii chloridum edrophonium chloride	ethyldimethyl-3-hydroxyphenylammonium chloride
ergometrinum ergometrine	an alkaloid obtained from ergot
ergotaminum ergotamine	an alkaloid obtained from ergot
erythromycinum erythromycin	an antibiotic substance obtained from cultures of *Streptomyces erythreus*, or the same substance produced by any other means
etamiphyllinum etamiphyllin	7-(2-diethylaminoethyl)theophylline
ethaverinum ethaverine	6,7-diethoxy-1-(3′,4′-diethoxybenzyl)isoquinoline
ethinamatum ethinamate	1-ethynylcyclohexyl carbamate
ethotoinum ethotoin	3-ethyl-5-phenylhydantoin
ethypiconum ethypicone	4,6-dioxo-3-methyl-5,5-diethyl-1,4,5,6-tetrahydropyridine
etoxeridinum etoxeridine	1-[2-(2-hydroxyethoxy)ethyl]-4-phenylpiperidine-4-carboxylic acid ethyl ester
florantyronum florantyrone	γ-fluoranthen-8-yl-γ-oxobutyric acid
fludroxortisoni acetas fludrocortisone acetate	21-acetoxy-9α-fluoro-11β,17α-dihydroxypregn-4-ene-3,20-dione
fluoxymesteronum fluoxymesterone	9α-fluoro-11β,17β-dihydroxy-17α-methylandrost-4-ene-3-one
forminitrazolum forminitrazole	2-formamido-5-nitrothiazole
glucurolactonum glucurolactone	γ-lactone of D-glucofuranuronic acid
glutethimidum glutethimide	3-ethyl-3-phenyl-2,6-dioxopiperidine
glycerolum glycerol	propane-1,2,3-triol
hexetidinum hexetidine	bis-1,3-(β-ethylhexyl)-5-methyl-5-aminohexahydropyrimidine
hexocyclii methylsulfas hexocyclium methylsulfate	*N*-(β-cyclohexyl-β-hydroxy-β-phenylethyl)-*N*′-dimethylpiperazinium methylsulfate
hexylcainum hexylcaine	1-cyclohexylamino-2-prophyl benzoate
histapyrrodinum histapyrrodine	*N*-pyrrolidylethyl-*N*-phenylbenzylamine
homarylaminum homarylamine	*N*-methyl-5-aminoethyl-1,2-methylenedioxybenzene
hydrocortamati hydrochloridum hydrocortamate hydrochloride	21-diethylaminoacetoxy-11,17-dihydroxypregn-4-ene-3,20-dionehydrochloride

Recommended International Non-Proprietary Name (Latin, English)	*Chemical Name or Description*
hydroxystilbamidinum hydroxystilbamidine	1-(4-amidino-2-hydroxyphenyl)-2-(4-amidinophenyl)ethylene
hydroxyzinum hydroxyzine	1-(*p*-chlorobenzhydryl)-4-[2-(2-hydroxyethoxy)ethyl]piperazine
injectio insulini zinci globinati globin zinc insulin injection	a sterile buffered solution of insulin with zinc chloride and globin
injectio insulini zinci protaminati protamine zinc insulin injection	a sterile buffered suspension of insulin with zinc chloride and protamine
isometheptenum isometheptene	2-methylamino-6-methylhept-5-ene
isophanum insulinum isophane insulin	a sterile suspension of insulin with the isophanic equivalent of protamine and zinc chloride
isothipendylum isothipendyl	10-(3-dimethylaminopropyl)-9-thia-4,10-diazaanthracene
lanatosidum C lanatoside C	glycoside obtained from the leaves of *Digitalis lanata* Ehrh.
laudexii methylsulfas laudexium methylsulfate	decamethylene-α,ω-bis-[1-(3′,4′-dimethoxybenzyl)-1,2,3,4-tetrahydro-6,7-dimethoxy-2,2-dimethylisoquinolinium sulfate]
lauralkonii chloridum lauralkonium chloride	2-(*p*-laurylphenyloxy)ethylbenzyldimethylammonium chloride
leucovorinum leucovorin	5-formyl-5,6,7,8-tetrahydropteroylglutamic acid
levomoramidum levomoramide	(-)-3-methyl-2,2-diphenyl-4-morpholinobutyrylpyrrolidine
levothyroxinum natricum levothyroxine sodium	L-β-[(4-hydroxy-3,5-diiodophenoxy)-3,5-diiodophenyl]-alanine sodium
liothyroninum liothyronine	L-4-(4-hydroxy-3-iodophenoxy)-3,5-diiodophenylalanine
lucanthonum lucanthone	1-(2-diethylaminoethylamino)-4-methylthiaxanthone
macrogoli lauras 600 macrogol laurate 600	mono ester of lauric acid and polyethylene glycol 600
macrogoli oleas 600 macrogol oleate 600	mono ester of oleic acid and polyethylene glycol 600
macrogoli stearas 600 macrogol stearate 600	mono ester of stearic acid and polyethylene glycol 600
macrogoli stearas 1000 macrogol stearate 1000	mono ester of stearic acid and polyethylene glycol 1000
magnesii aluminii glycinas magnesium aluminium glycinate	hydroxy aluminium magnesium aminoacetate
mecamylaminum mecamylamine	3-methylaminoisobornane
melarsoprolum melarsoprol	2-[4-(4,6-diamino-2-*s*-triazinylamino)-phenyl]-4-hydroxymethyl-1,3,2-dithiaarsenolidine
mepacrinum mepacrine	3-chloro-9-(4′-diethylamino-1′-methylbutylamino)-7-methoxy-acridine
mephenterminum mephentermine	*N*,α,α-trimethyl-β-phenylethylamine

Recommended International Non-Proprietary Name (Latin, English)	*Chemical Name or Description*
meprobamatum meprobamate	2,2-di(carbamoyloxymethyl)pentane
meprylcainum meprylcaine	2-methyl-2-propylaminopropyl benzoate
mercaptopurinum mercaptopurine	6-purinethiol
mercuderamidum mercuderamide	*o*-carboxyphenoxyacetic acid amide of hydroxymercuripropanol
mercumatilinum natricum mercumatilin sodium	sodium 8-(2′-methoxy-3′-hydroxymercuripropyl)coumarin-3-carboxylate (sodium mercumallylate) theophylline
mesuximidum mesuximide	1,3-dimethyl-2,5-dioxo-3-phenylpyrrolidine
methallenestrilum methallenestril	3-(6-methoxy-2-naphthyl)-3-ethyl-2,2-dimethylpropionic acid
methioninum methionine	(±) 2-amino-4-methylthiobutyric acid
methituralum methitural	5-methylthioethyl-5-(2-pentyl)-2-thiobarbituric acid
methopromazinum methopromazine	2-methoxy-10-(3-dimethylaminopropyl)phenothiazine
methoxyphedrinum methoxyphedrine	1-*p*-methoxyphenyl-2-methylamino-propan-1-one
methylcellulosum methylcellulose	cellulose methyl ether containing about 30 per cent. w/w of methoxyl
methylpentynolum methylpentynol	3-methylpent-1-yn-3-ol
methylphenidatum methylphenidate	α-phenyl-α-(2-piperidyl)methyl acetate
methyltestosteronum methyltestosterone	17β-hydroxy-17α-methyl-3-oxoandrost-4-ene
methyprylonum methyprylon	3,3-diethyl-5-methylpiperidine-2,4-dione
monobenzonum monobenzone	monobenzyl ether of hydroquinone
morpheridinum morpheridine	morpholinoethylnorpethidine
natrii acetrizoas sodium acetrizoate	sodium 3-acetamido-2,4,6-triiodobenzoate
natrii amidotrizoas sodium amidotrizoate	sodium 3,5-diacetamido-2,4,6-triiodobenzoate
natrii calcii edetas sodium calcium edetate	calcium chelate of the disodium salt of ethylenediamino-*N*,*N*,*N*′,*N*′-tetra-acetic acid
natrii dioctylis sulfosuccinas sodium dioctyl sulfosuccinate	di-β-ethylhexyl sodium sulfosuccinate
natrii diprotrizoas sodium diprotrizoate	sodium 3,5-dipropionylamino-2,4,6-triiodobenzoate

Recommended International Non-Proprietary Name (Latin, English)	*Chemical Name or Description*
natrii radiochromas (^{51}Cr) sodium radiochromate (^{51}Cr)	anionic hexavalent radioactive chromium (^{51}Cr) in the form of sodium chromate
natrii radiophosphas (^{32}P) sodium radiophosphate (^{32}P)	radioactive phosphorus in the form of a mixture of sodium dihydrogen phosphate and disodium hydrogen phosphate
neoarsphenaminum neoarsphenamine	sodium 3,3′-diamino-4,4′-dihydroxyarsenobenzene-*N*-methylenesulfoxylate
nicethamidum niketamide	pyridine-3-carboxylic acid diethylamide
nicotinamidum nicotinamide	pyridine-3-carboxylic acid amide
nidroxyzonum nidroxyzone	5-nitro-2-furaldehyde 2-(2-hydroxyethyl)semicarbazone
nitricholinii perchloras nitricholinium perchlorate	2-hydroxyethyltrimethylammonium nitric acid ester perchlorate
norethandrolonum norethandrolone	17α-ethyl-17β-hydroxy-3-oxoestr-4-ene
novobiocinum novobiocin	an antibiotic substance obtained from cultures of *Streptomyces spheroides*, or the same substance produced by any other means
nystatinum nystatin	an antibiotic substance obtained from cultures of *Streptomyces noursei* or the same substance produced by any other means
oestradioli benzoas oestradiol benzoate	3-benzoyloxy 17β-hydroxyoestra-1,3,5(10)-triene
oestradiolum oestradiol	3,17β-dihydroxyoestra-1,3,5(10)-triene
oestronum oestrone	3-hydroxy-17-oxoestra-1,3,5(10)-triene
oleandomycinum oleandomycin	an antibiotic substance obtained from cultures of *Streptomyces antibioticus*, or the same substance produced by any other means
ostreogrycinum ostreogrycin	an antibiotic substance obtained from cultures of *Streptomyces ostreogriseus*, or the same substance produced by any other means
oxeladinum oxeladin	2-(2-diethylaminoethoxy)ethylα-ethyl-α-phenylbutyrate
pamaquinum pamaquin	6-methoxy-8-(4-diethylamino-1-methylbutylamino) quinoline salt of 2,2′-dihydroxy-1,1′-dinaphthylmethane-3,3′-dicarboxylic acid
pentacynii chloridum pentacynium chloride	*N*-[*N*-(5-cyano-5,5-diphenylpentyl)-*N*′-dimethylammoniumethyl]-*N*-methylmorpholinium dichloride
pentaquinum pentaquin	8-(5-isopropylamino-pentylamino)-6 methoxyquinoline
pentetrazolum pentetrazol	pentamethylene-1,5-tetrazole
pentolonium pentolonium	1,5-(1,1′-dimethyl-1,1′-dipyrrolidyl)pentane
pentoxyverinum pentoxyverine	2-(2-diethylaminoethoxy)ethyl 1-phenyl-cyclopentane-1-carboxylate
petrichloralum petrichloral	pentaerythritol chloral

Recommended International Non-Proprietary Name (Latin, English)	*Chemical Name or Description*
phenacetinum phenacetin	*p*-ethoxyacetanilide
phenazonum phenazone	2,3-dimethyl-1-phenyl-5-pyrazolone
phenaglycodolum phenaglycodol	2-*p*-chlorophenyl-3-methylbutane-2,3-diol
phenamazolinum phenamazoline	2-anilinomethylimidazoline
phenobarbitalum phenobarbital	5-ethyl-5-phenylbarbituric acid
phenobarbitalum natricum phenobarbital sodium	sodium derivative of 5-ethyl 5-phenylbarbituric acid
phenobutiodilum phenobutiodil	α-(-2,4,6-triiodophenoxy)butyric acid
phenoxybenzaminum phenoxybenzamine	*N*-phenoxyisopropyl-*N*-benzyl-β-chloroethylamine
phenoxymethylpenicillinum phenoxymethylpenicillin	an antibiotic in which the benzyl group of penzylpenicillin has been replaced by a phenoxymethyl group
phenylhydrargyri boras phenylmercuric borate	equimolecular compound of phenylmercuric borate and phenylmercuric hydroxide
phensuximidum phensuximide	1-methyl-3-phenyl-2,5-dioxopyrrolidine
phenythilonum phenythilone	2-ethyl-2-phenylthiamorpholine-3,5-dione
phenyltoloxaminum phenyltoloxamine	2-(*o*-benzylphenoxy)ethyldimethylamine
phenytoinum phenytoin	5,5-diphenylhydantoin
phthalysulfamethizolum phthalysulfamethizole	5-phthalysulfanilamido-2-methyl-1,3,4-thiadiazole
pimetremidum pimetremide	*N*-methyl-*N*-(β-picolyl)tropamide
pipenzolati bromidum pipenzolate bromide	1-ethyl-3-piperidyl benzilate methyl bromide
piperazini calcii edetas piperazine calcium edetate	a chelate produced by reacting edetic acid with calcium carbonate and piperazine
piperidolatum piperidolate	*N*-ethylpiperid-3-yl diphenylacetate
pipradrolum pipradrol	α,α-diphenyl-α-piperid-2-ylmethanol
polymyxinum B polymyxin B	an antibiotic substance obtained from cultures of *Bacillus polymyxa*, or the same substance produced by any other means
pramocainum pramocaine	1-[3-(4-morpholino)propoxy]-4-butoxybenzene
prednisolonum prednisolone	11β,17α,21-trihydroxypregna-1,4-diene-3,20-dione
prednisonum prednisone	17α,21-dihydroxypregna-1,4-diene-3,11,20-trione

Recommended International Non-Proprietary Name (Latin, English)	*Chemical Name or Description*
probenecidum probenecid	*p*-(di-*n*-propylsulfamoyl)benzoic acid
prochlorperazinum prochlorperazine	1-[3-(2-chloro-10-phenothiazinyl)propyl]-4-methylpiperazine
prodeconii bromidum prodeconium bromide	*N,N,N′,N′*-tetramethyl-*N*-*N′*-bis-(carbopropoxymethyl)-2,13-dioxatetradecane-1,14-diammonium dibromide
progesteronum progesterone	3,20-dioxopregn-4-ene
proguanilum proguanil	N^1-4-chlorophenyl-N^5-isopropyldiguanide
promoxolanum promoxolane	2,2-diisopropyl-4-hydroxymethyl-1,3-dioxolane
propanocainum propanocaine	3-diethylamino-1-phenylpropyl benzoate
propazolamidum propazolamide	2-propionamido-1,3,4-thiadiazole-5-sulfonamide
propoxycainum propoxycaine	2-diethylaminoethyl 4-amino-2-propoxybenzoate
propylhexedrinum propylhexedrine	1-cyclohexyl-2-methylaminopropane
prothipendylum prothipendyl	10-(3-dimethylaminopropyl)-9-thia-4,10-diazaanthracene
proxymetacainum proxymetacaine	β-diethylaminoethyl 3-amino-4-propoxybenzoate
pyridostigminum pyridostigmin	dimethylcarbamic ester of 1-methyl-3-hydroxypyridine
pyrvinii chloridum pyrvinium chloride	6-dimethylamino-2-[2-(2,5-dimethyl-1-phenyl-3-pyrryl)vinyl]-1-methylquinolinium chloride
quinisocainum quinisocaine	1-(2-dimethylaminoethoxy)-3-butylisoquinoline
racemoramidum racemoramide	(±)-3-methyl-2,2-diphenyl-4-morpholinobutyrylpyrrolidine
rescinnaminum rescinnamine	methyl 1α.2β,3α,4,4aα,5,7,8,13,13bβ,14,14aα-dodecahydro-2α,11-dimethoxy-3β-(3,4,5-trimethoxycinnamoyloxy)-benzo[*g*]indolo[2,3-α]quinolizine-1β-carboxylate or 3,4,5-trimethoxycinnamic acid ester of methyl reserpate
reserpinum reserpine	methyl 1α,2β,3α,4,4aα,5,7,8,13,13bβ,14,14aα-dodecahydro-2α,11-dimethoxy-3β-(3,4,5-trimethoxybenzoyloxy)-benzo[*g*]indolo[2,3-α]quinolizine-1β-carboxylate or 3,4,5-trimethoxybenzoic acid ester of methyl reserpate
riboflavinum riboflavine	6,7-dimethyl-9-(D-1′-ribityl)isoalloxazine
secobarbitalum secobarbital	5-allyl-5-(1-methylbutyl)barbituric acid
sorbimacrogoli oleas 100 sorbimacrogol oleate 100	mono ester of oleic acid and tripolyethyleneglycol 100 sorbitan ether

Recommended International Non-Proprietary Name (Latin, English)	*Chemical Name or Description*
sorbimacrogoli oleas 300 sorbimacrogol oleate 300	mono ester of oleic acid and tripolyethyleneglycol 300 sorbitan ether
spiramycinum spiramycin	an antibiotic substance obtained from cultures of *Streptomyces ambofaciens*, or the same substance produced by any other means
stilbamidini isethionas stilbamidine isethionate	1,2-bis-(4-amidinophenyl)-ethylene di-(2-hydroxyethane)-sulfonate
streptodornasum streptodornase	enzyme obtained from cultures of various strains of *Streptococcus hemolyticus* and capable of hydrolysing desoxyribonucleoproteins
streptokinasum streptokinase	co-enzyme obtained from cultures of various strains of *Streptococcus hemolyticus* and capable of changing plasminogen into plasmin
streptovarycinum streptovarycin	an antibiotic substance composed of several related components obtained from cultures of *Streptomyces variabilis*
succinylsulfathiazolum succinylsulfathiazole	2-(N^4-3-carboxypropionylsulfanilamido)thiazole
sulfadiazinum sulfadiazine	2-sulfanilamidopyrimidine
sulfadiazinum natricum sulfadiazine sodium	sodium derivative of 2-sulfanilamidopyrimidine
sulfadicramidum sulfadicramide	N^1-(3,3-dimethylacroyl)sulfanilamide
sulfaguanidinum sulfaguanidine	N^1-amidinosulfanilamide
sulfamerazinum sulfamerazine	2-sulfanilamido-4-methylpyrimidine
sulfamerazinum natricum sulfamerazine sodium	sodium derivative of 2-sulfanilamido-4-methylpyrimidine
sulfanilamidum sulfanilamide	4-aminophenylsulfonamide
sulfaproxylinum sulfaproxyline	N^1-(4-isopropoxybenzoyl)sulfanilamide
sulfarsphenaminum sulfarsphenamine	disodium 3,3′-diamino-4,4′-dihydroxyarsenobenzene-*N*,*N*′-bismethylenebisulfite
sulfathiazolum sulfathiazole	2-sulfanilamidothiazole
suspensio insulini cum zinco (composita) insulin zinc suspension (compound)	a sterile buffered mixture of insulin zinc suspension (amorphous) (30 per cent.) and insulin zinc suspension (crystalline) (70 per cent.)
suspensio insulini cum zinco (amorphi) insulin zinc suspension (amorphous)	a sterile buffered suspension of the amorphous form of insulin with zinc chloride
suspensio insulini cum zinco (crystallisati) insulin zinc suspension (crystalline)	a sterile buffered suspension of the crystalline form of insulin with zinc chloride
testosteronum testosterone	17β-hydroxy-3-oxoandrost-4-ene
tetrabarbitalum tetrabarbital	5-ethyl-5-(1-ethylbutyl)barbituric acid

Recommended International Non-Proprietary Name (Latin, English)	*Chemical Name or Description*
tetracainum tetracaine	2-dimethylaminoethyl 4-butylaminobenzoate
tetracyclinum tetracycline	4-dimethylamino-1,4,4a,5,5a,6,11,12a-octahydro-3,6,10,12,12a-pentahydroxy-6-methyl-1,11-dioxonaphtacene-2-carboxyamide
tetryzolinum tetryzoline	2-(1,2,3,4-tetrahydronaphth-1-yl)-2-imidazoline
thenalidinum thenalidine	1-methyl-4-[*N*-(2-thenyl)anilino]piperidine
thialbarbitalum thialbarbital	5-allyl-5-(2-cyclohexenyl)-2-thiobarbituric acid
thiopentalum natricum thiopental sodium	monosodium derivative of 5-(1-methylbutyl)-5-ethyl-2-thiobarbituric acid
thiotetrabarbitalum thiotetrabarbital	5-(1-ethylbutyl)-5-ethyl-2-thiobarbituric acid
tolbutamidum tolbutamide	*N*-*p*-tolylsulfonyl-*N'*-*n*-butylcarbamide
tolonii chloridum tolonium chloride	3-amino-7-dimethylamino-2-methylphenazathionium chloride
tosylchloramidum natricum tosylchloramide sodium	sodium toluene-4-sulfonylchloramide
tretaminum tretamine	2,4,6-tri-(ethyleneimino)-*s*-triazine
tolproninum tolpronine	1-(1,2,3,6-tetrahydropyridino)-3-*o*-tolyloxypropan-2-ol
tricyclamoli chloridum tricyclamol chloride	(+)-1-(3-cyclohexyl-3-hydroxy-3-phenylpropyl)-1-methylpyrrolidinium chloride
tridihexethyli chloridum tridihexethyl chloride	3-diethylamino-1-phenyl-1-cyclohexyl-1-propanol ethochloride
trimeperidinum trimeperidine	1,2,5-trimethyl-4-phenyl-4-propionoxypiperidine
trimetaphani camphorsulfonas trimetaphan camphorsulfonate	(+)-4,6-dibenzyl-5-oxo-1-thia-4,6-diazatricyclo [6: 3: 0: $0^{3,7}$] undecanium (+)-camphorsulfonate
triprolidinum triprolidine	*trans*-1-(pyrid-2-yl)-3-pyrrolidino-1-*p*-tolylprop-1-ene
tryparsamidum tryparsamide	sodium *N*-phenylglycylamide-4-arsonate
vancomycinum vancomycin	an antibiotic substance obtained from cultures of *Streptomyces orientalis*, or the same substance produced by any other means
verazidum verazide	1-isonicotinoyl-2-veratrylidene hydrazine
zoxazolaminum zoxazolamine	2-amino-5-chlorobenzoxazole

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